HK-4DA202 4-Axis Screw Machine Motion Control System User's Manual

V1.0

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Catalogue

Chapter 1 Overview

HengKongControl Technology HK-4D-A202 automatic screw motion control system has 4 motor control axes, which can support XYZ 3-axis, XYZ 3-axis + rotary axis, XYZ 3-axis + 2Y-axis automatic screw motion control, and it basically meets the needs of the existing gantry-type, platform-type, and dual-platform type of automatic screw locking and attaching control. The handheld programmer adopts a 480 * 272 pixel high-definition true-color 4.3-inch LCD display, which makes the programming menu content richer. The main board and the handheld programmer use industrial field bus communication connection, higher rate, stronger anti-interference. Through the handheld programmer can use the U disk interface to upgrade the system to backup convenient equipment mass production. The system adopts ARM + DSP control program, with strong computing power, speed refresh time is very small, motion control acceleration and deceleration performance is superior, can support high-precision and high-speed three-dimensional linear motion. The motion control motherboard can store at least 100 screw machining files, and each file can store 1024 screw machining programming points.

1.1 Hardware

1. Motor axis output: 4-axis output, respectively, XYZ three-dimensional coordinate axes, Y2 extension axis to realize the function of dual Y-axis, can be real dual Y-axis screw machine control.

2. Pulse output frequency: the highest 4MHz pulse output, with 20,000 pulses per motor revolution, for example, can reach 6000 rpm, enough to meet the existing high-speed servo motor 5000 rpm requirements.

3. Input and output: 4 dedicated inputs (XYZR (Y2) origin). 20 general-purpose inputs, 16 general-purpose outputs. All use optocoupler isolation, each output current up to 500mA.

4. U disk read/write function: use FAT32 file system, no longer subject to greater than 2G U disk can not be formatted into FAT format limitations.

5. Storage space: can store at least 100 screw files, each file 1024 programming points, you can import and export the system parameters and screw files to the U disk with one key, especially useful in multiple machines to copy each other's screw files.

6. Handheld programmer screen: 480 * 272 pixels HD true color 4.3-inch LCD display, so that the

operation menu interface is more informative.

7. Working voltage: DC 24V, current 5A.

8. Working environment: temperature 0 ℃ - 45 ℃, humidity 40% - 80%.

1.2 Software

1. Rich screw hole manual teaching function and graphic preview function.

2. Each screw hole instruction carries independent process parameters, can be accurate to each screw hole independent parameter lock attached.

3. DXF file conversion function, you can export the CAD screw hole position drawing to DXF file and turn it into a screw file.

4. With regional array copying, translation operations, batch editing, single-step operation, specified I / O input and output functions.

5.The system has automatic execution function, automatic reset, output setting, processing time timer and other functions.

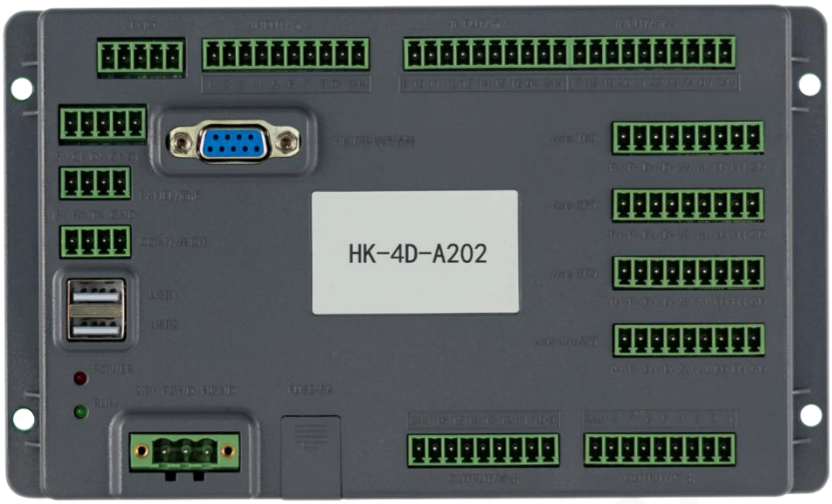
6. Customized obstacle avoidance point can solve the problem of screw obstacle avoidance and lock attachment.

7.In the reset action, each axis to return to the origin of each axis at the same time after the origin capture action to reduce the reset error.

8. With Chinese IME input method.

1.3 Accessories

1.3.1 MainBoard



1.3.2 Teach box

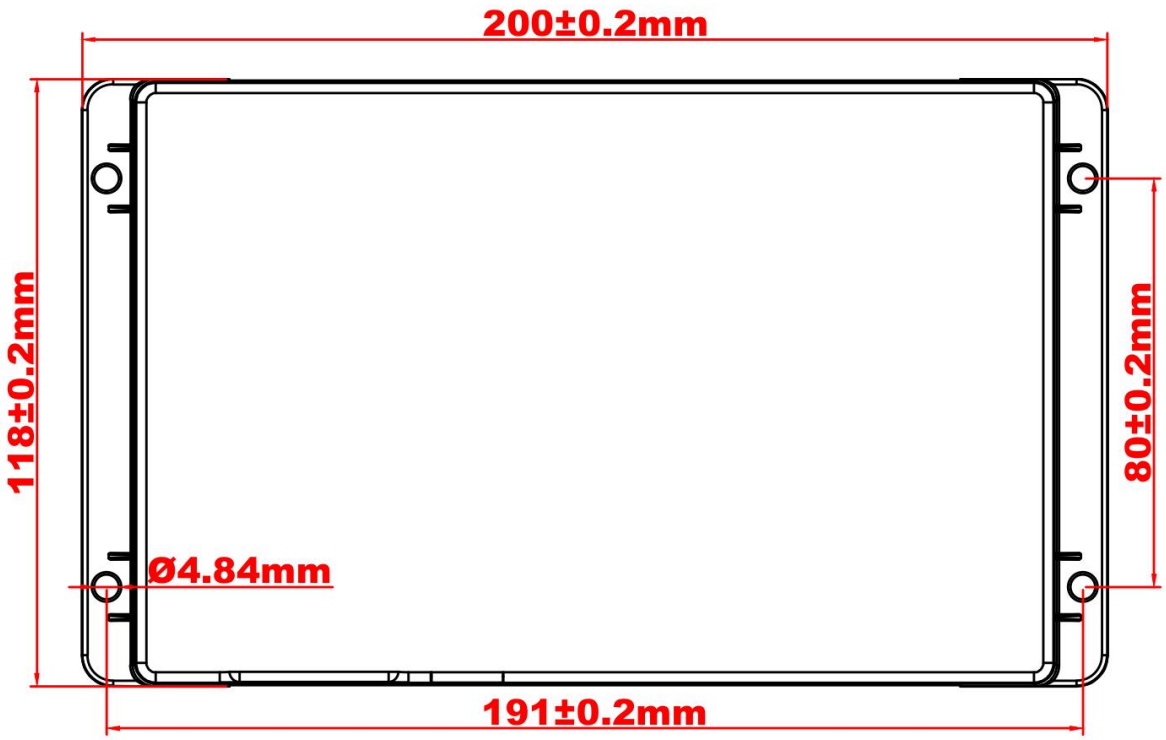
1.3.3 Connection cable (Length can be specified)

Name	Quantity	Unit	Length(m)
DB9 extension cable	1	Article	1.5
DB9 extension cable（elbow）	1	Article	0.75

DB9 extension cabel

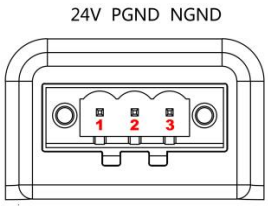
DB9extension cabel（elbow）

1.4 MainBoard bottom plate installation dimension drawing



1.5 Special interface definition and description

1.5.1 DC24V Power inputD

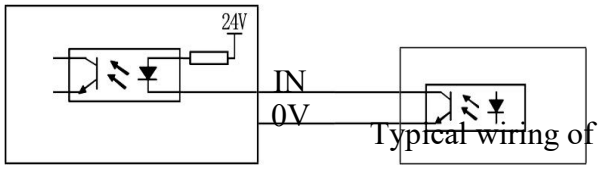


PWRIN Definition and description of power input pin			
NO.	Name	Function	Wiring description
1	24V	24V Power input	Connect 24V Power VCC(DC V+)
2	PGND	0V	Connect 24V Power 0V (DC V-)
3	NGND	GND	Connect 24V Power FG (⏚)

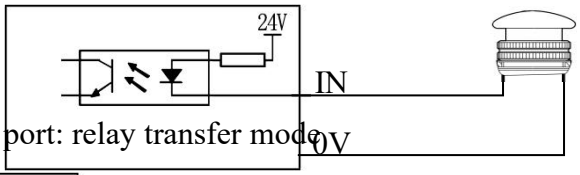
1.5.2 Input Port Definition and Description

Input pin definition and function description			
NO.	Name	Function	Wiring description
1	Input 1	Home X	X axis origin sensor signal pin OUT
2	Input 2	Home Y	Y axis origin sensor signal pin OUT
3	Input 3	Home Z	Z axis origin sensor signal pin OUT
4	Input 4	Home A/2Y	A/2Y axis origin sensor signal pin OUT
5-24	Input 5-24	General Input	Input signals such as pushbuttons and sensors can be connected

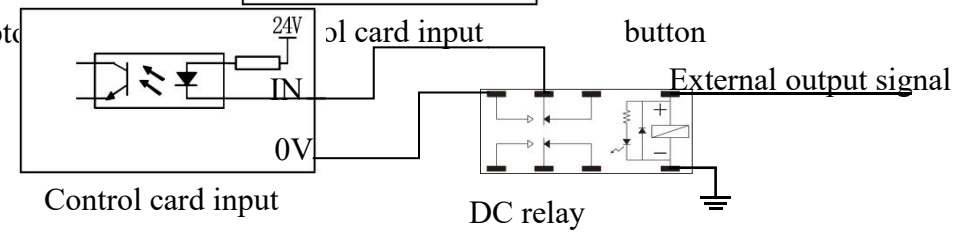
Typical wiring of input port: Optocoupler



Typical input wiring: switch signal wiring



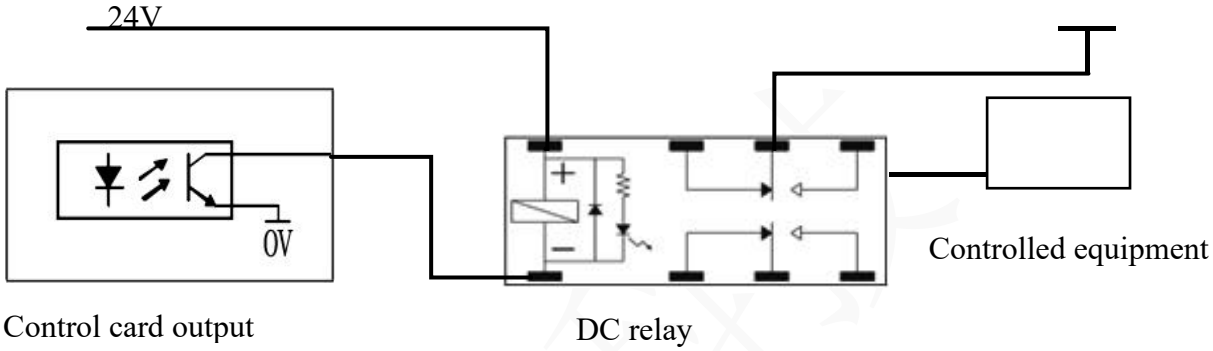
Typical wiring of input port: relay transfer mode



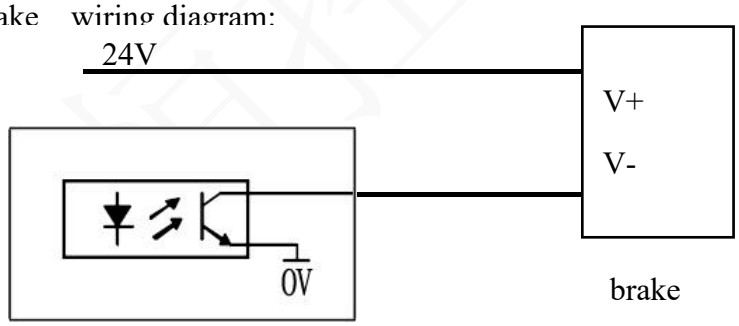
1.5.3 Output Port Definition and Description

Name	Function	Wiring Descriptions
Out 1-15	Universal Outputs	Optocoupler output
Out 16	Brake	Default as the brake control signal.

Typical wiring of output port: relay transfer mode



Brake wiring diagram:



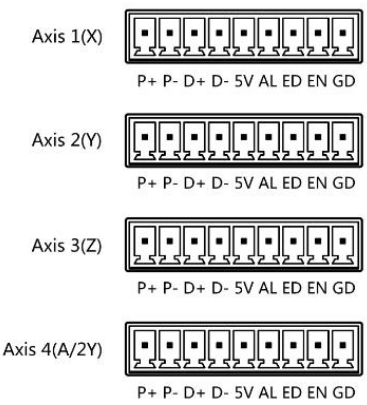
Control card brake signal

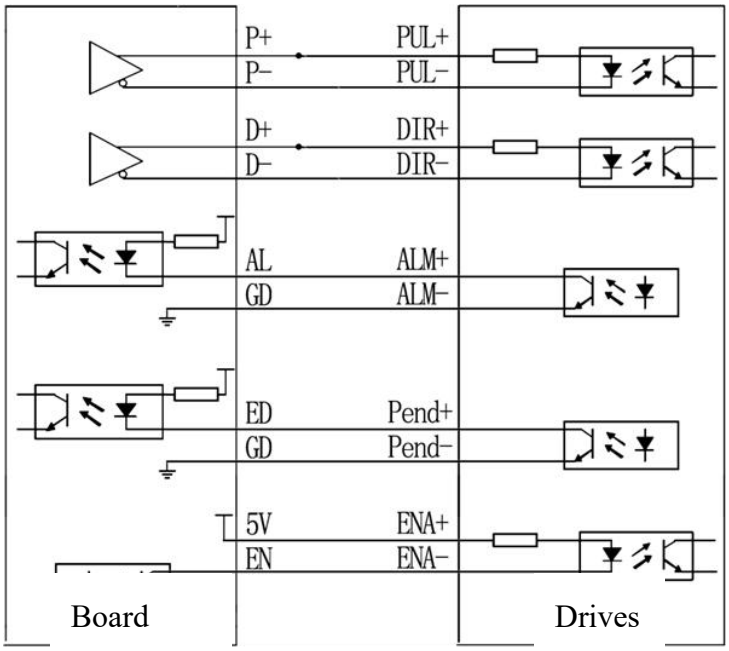
1.5.4 Motor Axis Port

Motor signal pin definition and function description			
NO.	Name	Function	Wiring description
1	P+	Pulse signal+	Positive motor pulse signal, differential signal type (5V voltage domain)
2	P-	Pulse signal-	Motor pulse negative signal, differential signal

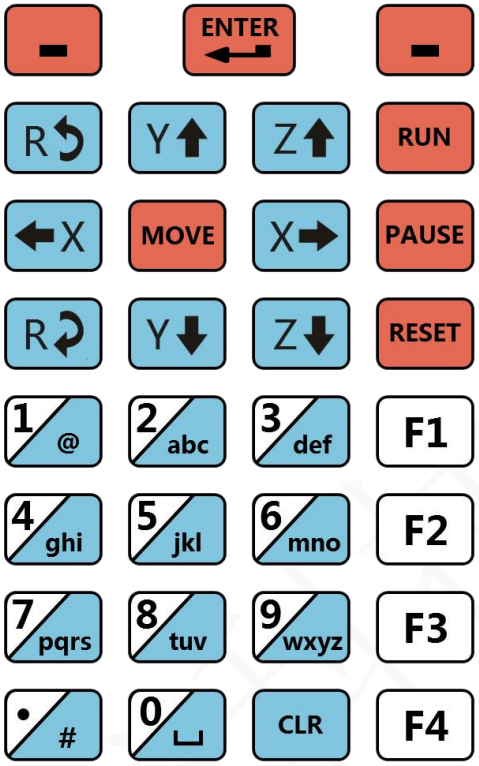
			type (5V voltage domain)
3	D+	Direction signal+	Positive motor direction signal, differential signal type (5V voltage domain)
4	D-	Direction signal-	Negative motor direction signal, differential signal type (5V voltage domain)
5	5V	5V DC power	5V DC power
6	AL	Drive Alarm Input	Drive alarm signal input port
7	ED	Positioning Completion Signal	Closed-loop drive positioning completion signal input port
8	EN	Driver Enable Signal	Driver enable signal output port
9	GD	Drive/Encoder Ground	Common ground port for driver, encoder and board

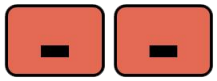
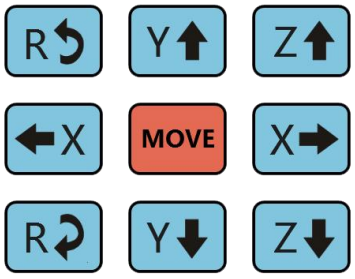
Differential wiring diagram:

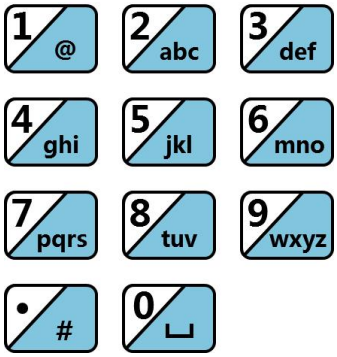




Chapter 2 Handheld programmer key description



Key Appearance	Name	Functionality
	Function	Different function in different interface
	Enter	OK button for data modification, parameter saving, etc. Calibration operation on the main screen.
	Direction	XYZ control axis move. [MOVE] : User for teach point,support move or manual input.

	Num&Char	Input Num&Char. [#] Switch Input for Number,Char,Chinese.
	Run	Start machine run.
	Pause	Pause machine running.
	Reset	Reset machine.
	F1	Function Key F1.
	F2	Different functions for different interfaces.
	F3	Different functions for different interfaces.
	F4	Different functions for different interfaces.
	Clearance	Clear modified error parameters, values. Clear files and commands. Yield clear 0.

Chapter 3 Work information description

When power on,the first interface will be shown.

Work File: Refers to the current processing file name.

Exe mode(Execution mode): refers to the operation mode of the machine; it is divided into manual, automatic, aging mode and dual-start mode, and the dual-start mode is only effective for the dual-Y structure (see 4.9.1 Execution Mode for details).

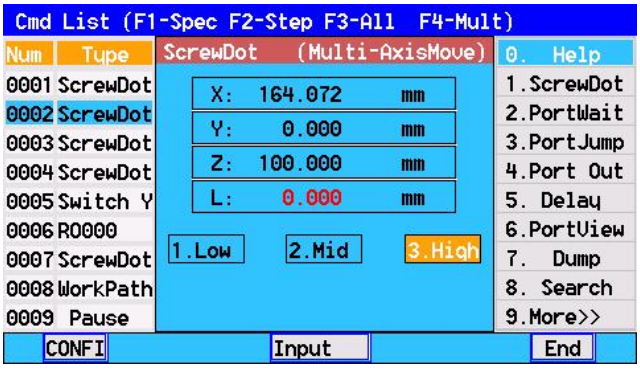
Product (Product quantity):refers to the machine operation has been completed production; when the number of processing = set production, it means that the machine has completed the number of processing and stop.

NG Num(Number of NG products): The number of NG products currently being processed by the machine.

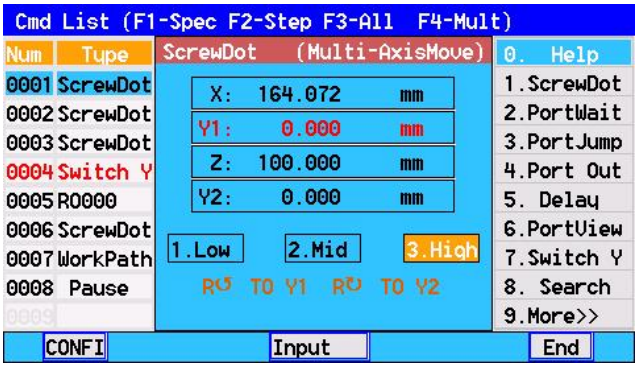
Set Limit: This refers to the machine running a preset output.

Running Speed: The percentage of speed of the running process of the device. This speed is the percentage of the speed set during instruction editing, ranging from 1 ~ 120%; in this screen, directly press the direction keys [Y ↑]/[Y ↓] to increase or decrease the percentage of the working speed, and press [Z ↑]/[Z ↓] to increase or decrease the percentage of the working speed in units of 5. Modification of this speed will take effect on the next run or the next screw hole run.

Press [Move] to move the device directly as shown.



Single Y-axis

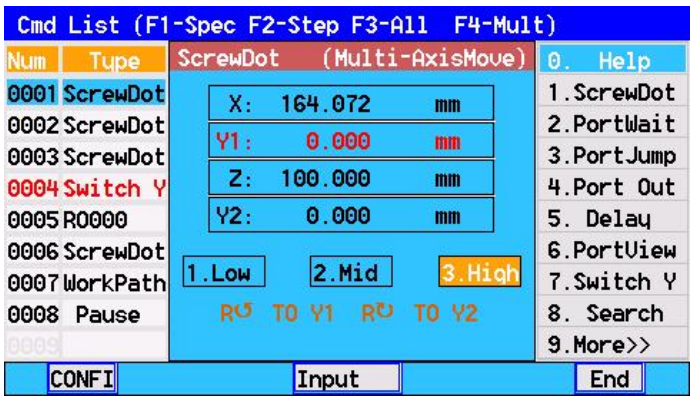


Dual Y-axis

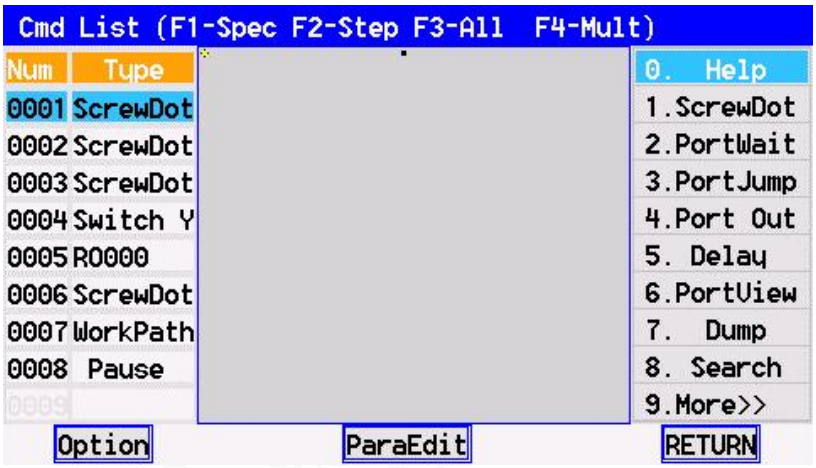
The Y-axis can be switched via R↺, R↻ in Dual Y mode, and the currently active Y-axis is displayed in red font.

Press [Menu] to enter the main interface, you can set the system, option parameters, file editing and import/export operations (see Chapter 4, Main Menu Interface Functions).

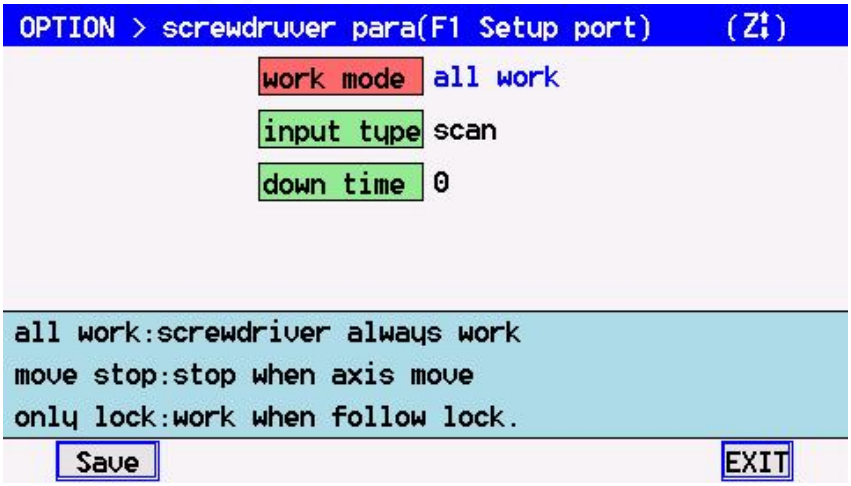
Press [AD JUST] to enter the manual calibration interface (mainly used for the replacement of fixtures, coordinate offset to align the coordinates)Take the first screw-hole instruction as the benchmark calibration: in the working interface, directly press the [Calibration] key, and then press the direction key to start calibration, the electrical head of the calibration is completed, press the ENTER key that is to complete the calibration operation, so that all the instructions containing the coordinates are offset accordingly.



Press [Para Edit] for quick access to the machining program editing screen (see 4.3 Editing Files for details).

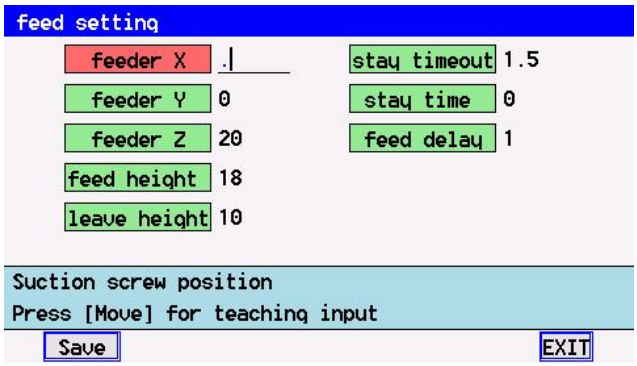


[F1] Without enabling smart batch, F1 is batch parameter (see 4.9.5 Batch Parameter for details), which can set the working mode of the batch, and after enabling smart batch, it is the function of setting smart batch, which can view or modify the parameters of the smart batch in a quick way.

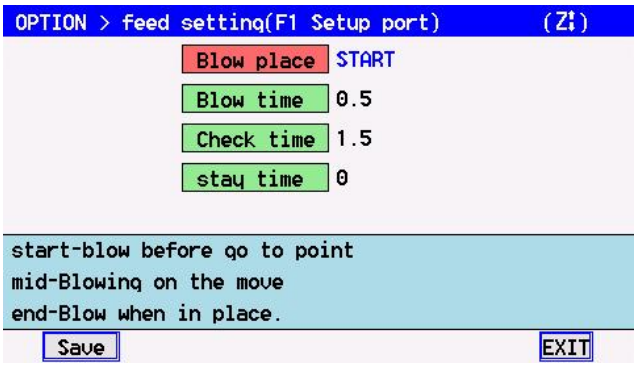


Screwdruver para

[F2] Quick setup of feeder related parameters (see 4.9.6 Feeding parameters for details).



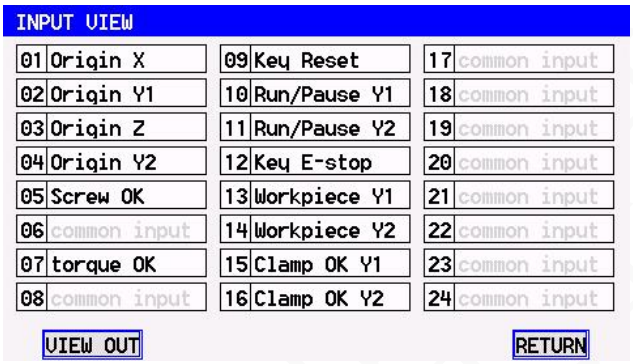
Suction feeding parameters

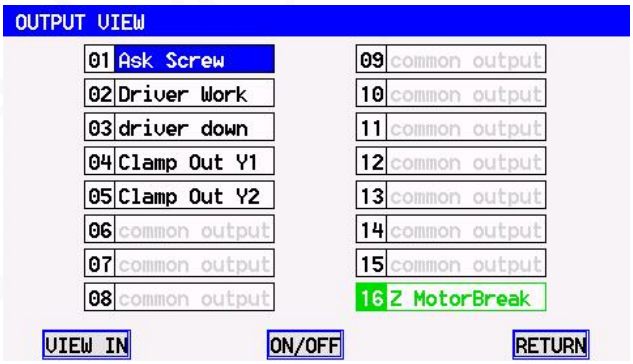


Blow Feeding Parameters

[F3] Shortcut panel for quick access to IO view and output test functions.

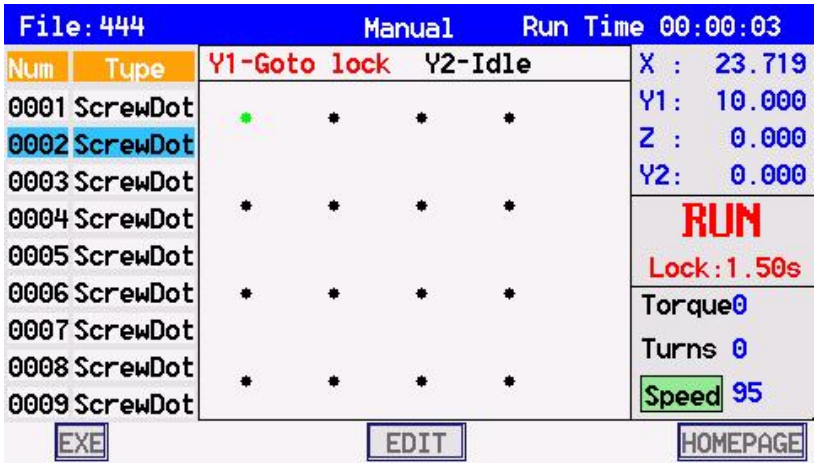
Output test can be performed by moving the cursor to the function position and then pressing the [On/Off] key to switch the status.



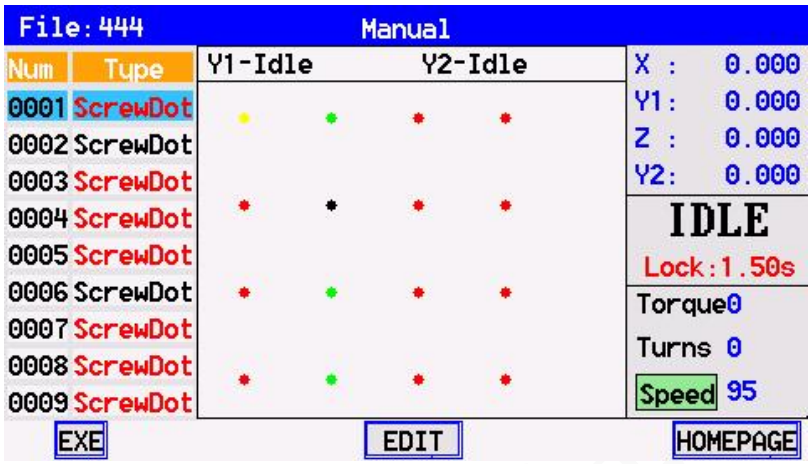


[F4] Quickly performs programming point batch operations (see 4.3 Editing Files for details).

Machining preview interface: When the equipment starts to run, it automatically enters the machining preview interface.

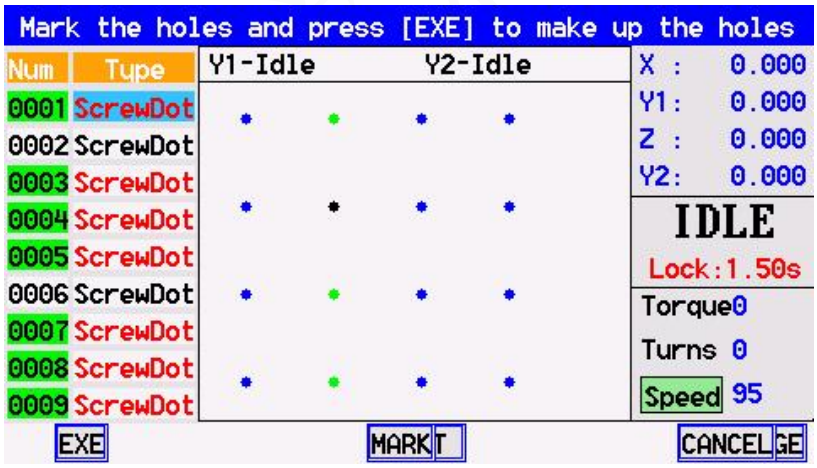


Real-time display of hole locking status during machining. The black dot is unprocessed, the green dot is OK, the red dot is NG, and the yellow blinking dot indicates the current cursor position.



When the device is running, the menu key is grey and unavailable, and black after it stops running, which means it can be used normally.

Punching operation： The device can be used to punch NG points, or freely select the locking attachment holes.



Execution: After selecting the hole position, execute the action of locking and attaching.

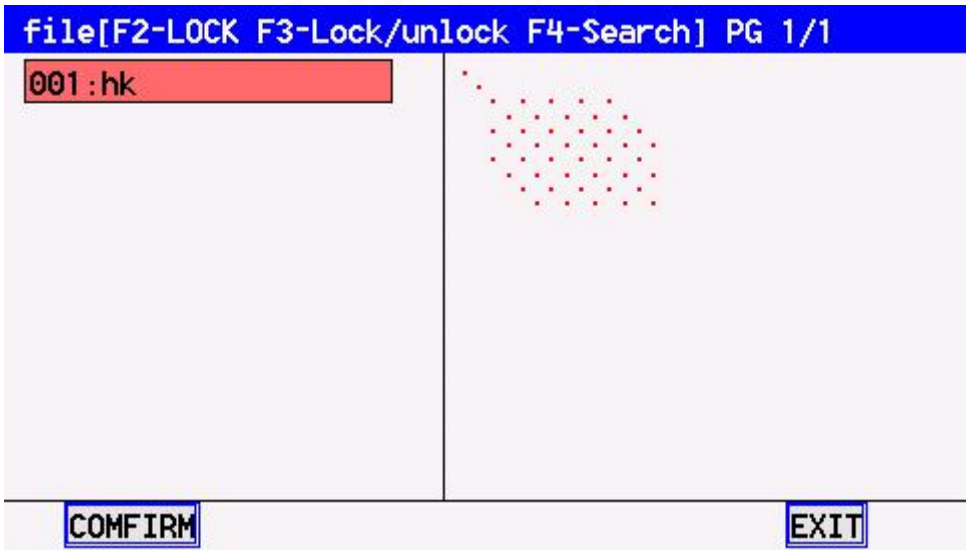
Marking: Mark or mark the points that need to be locked and attached or cancel the marking, the serial number of the marked holes will be displayed in green, and the preview of the points will be in blue.

Cancel: Cancel the marking of all holes.

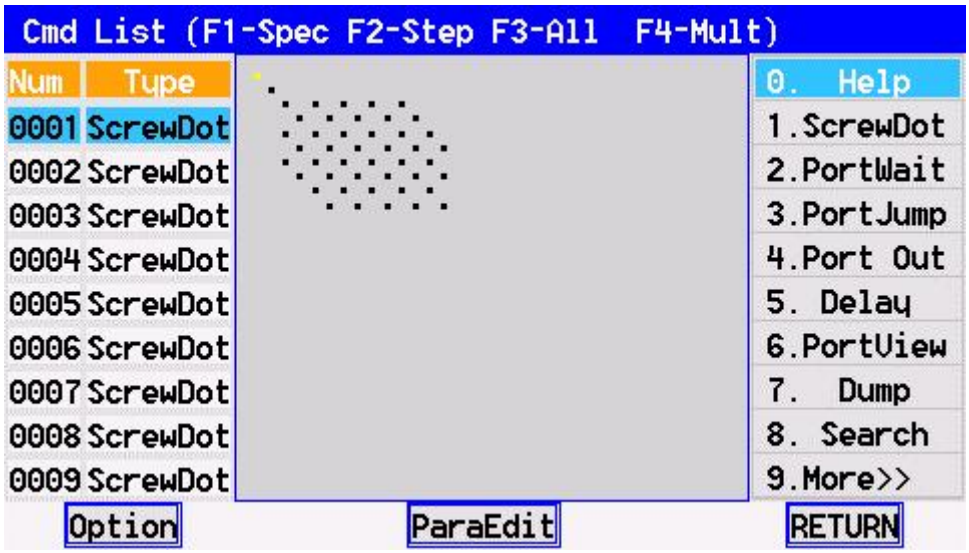
Chapter 4 Functional description of the main menu interface

4.1 Open file

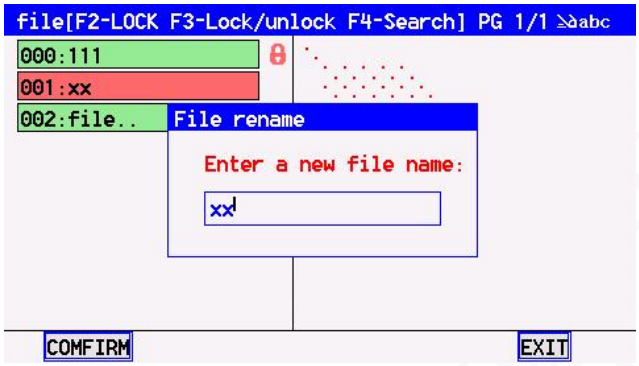
It means to open the existing processing file in the system, and the right side of the interface can preview the content of the programming file in real time for easy selection.

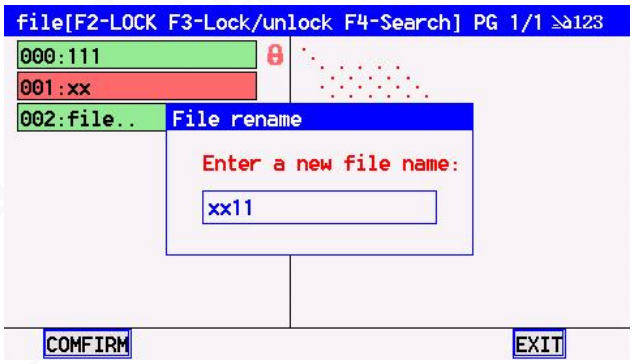


Press the [Open] key to open the currently selected file and jump to the programming interface.



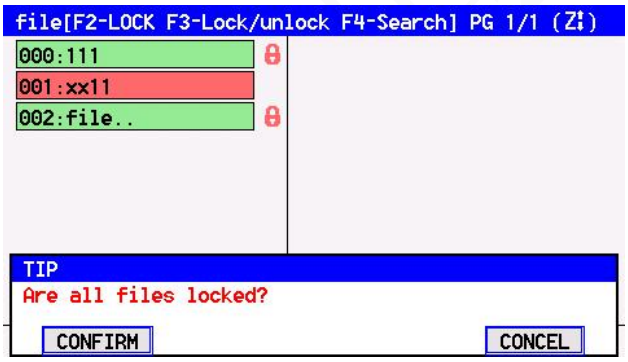
Press [File rename] to rename the selected file.

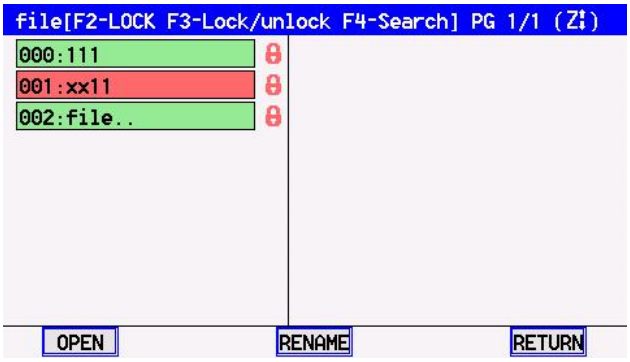




Name changes to locked files require unlocking the file.

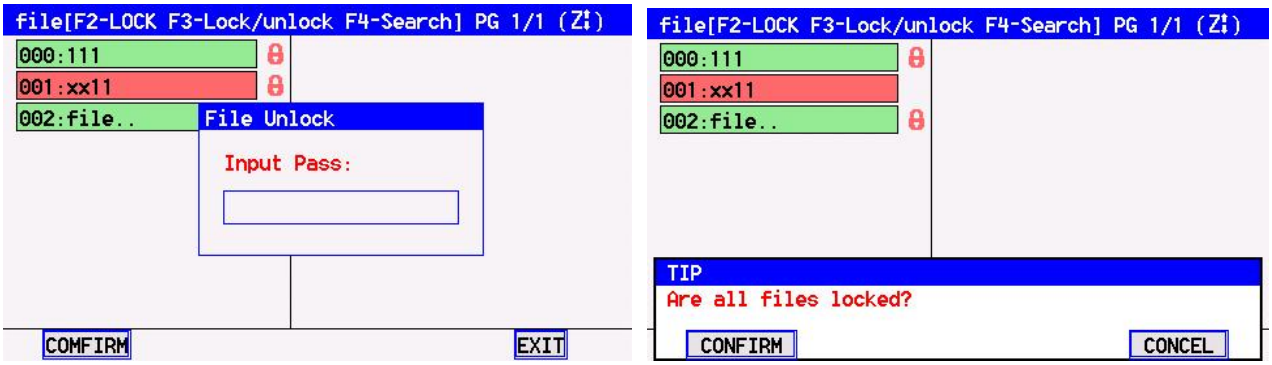
Press [F2] to lock all files.



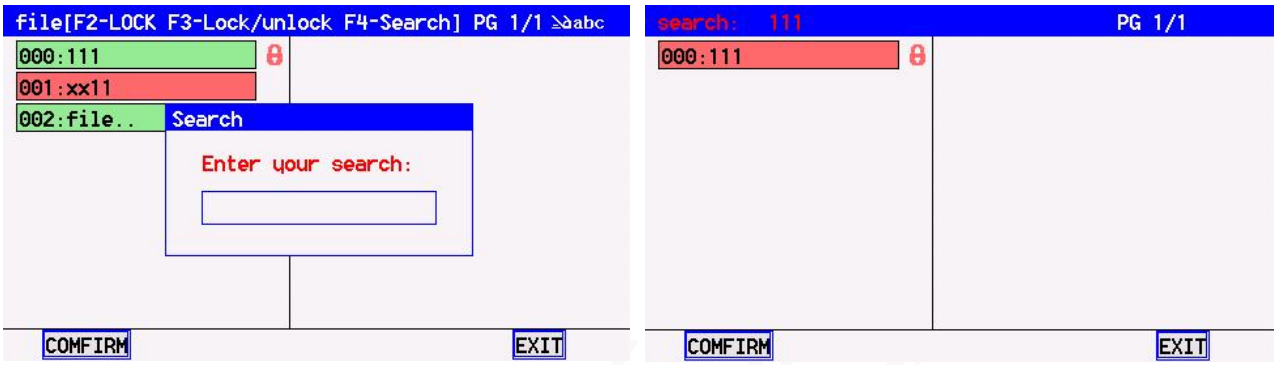


Press [F3] to lock or unlock the currently selected file, and enter a password to confirm when unlocking.

The file password is the user password, which can be modified in [System] - [Equipment Parameters].



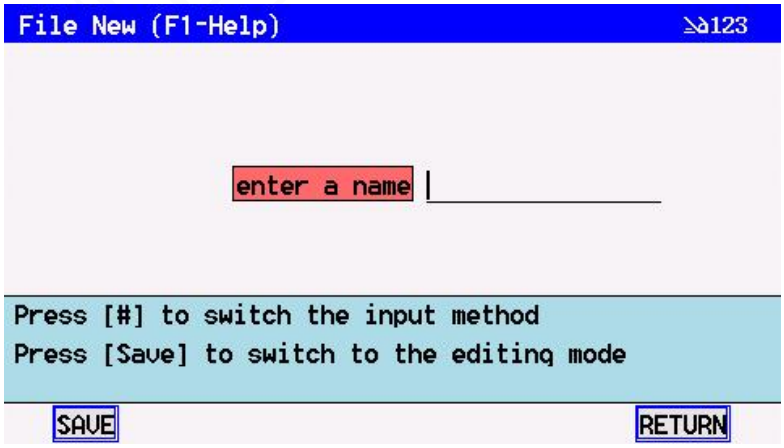
Press [F4] key to input file number or file name for file search.



Files that meet the search criteria will be re-listed; if the input search content is empty, all files will be displayed.

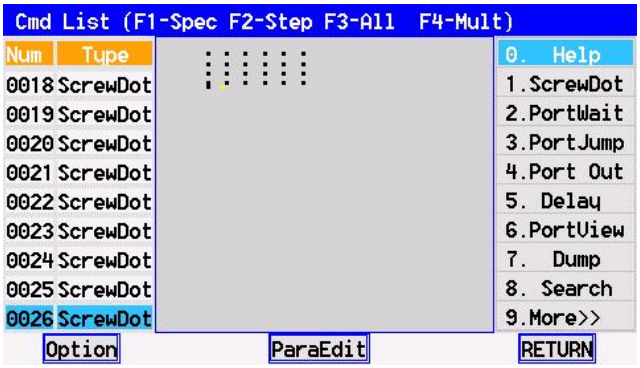
4.2 New file

Refers to the creation of a new processing file, press [#] to switch the input method, enter the file name and press [Save] to jump to the editing interface.

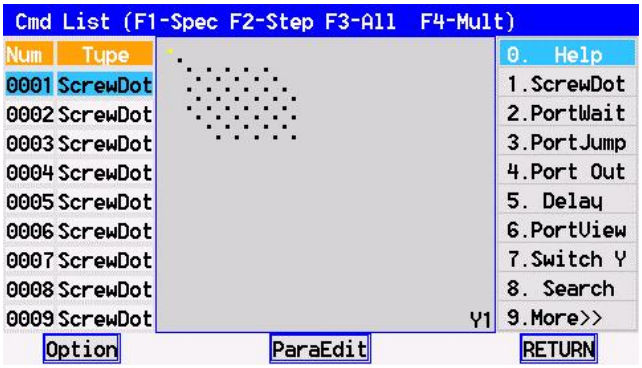


4.3 Edit file

Program and modify the current machining file.



Single Y-axis editing



Dual Y-axis editing screen

The keyboard [←X] key jumps to the first command in the current list, and the [X→] key jumps to the last command in the current list.

When multi-selecting, the [←X]/[X→] keys move the currently selected command up and down.

Keyboard [Y ↑] key can move up the current command, [Y ↓] key can move down the current command; when multi-select, [Y ↑] / [Y ↓] key can move the selected range.

Keyboard [Z ↑] key to page up to the previous page of the command list, [Z ↓] key to page down to the next page of the command list.

The keyboard [R↺] key enlarges the graphic display, and the down-key [R↻] key reduces the graphic display.

The [Clear] key clears the selected commands in the list.

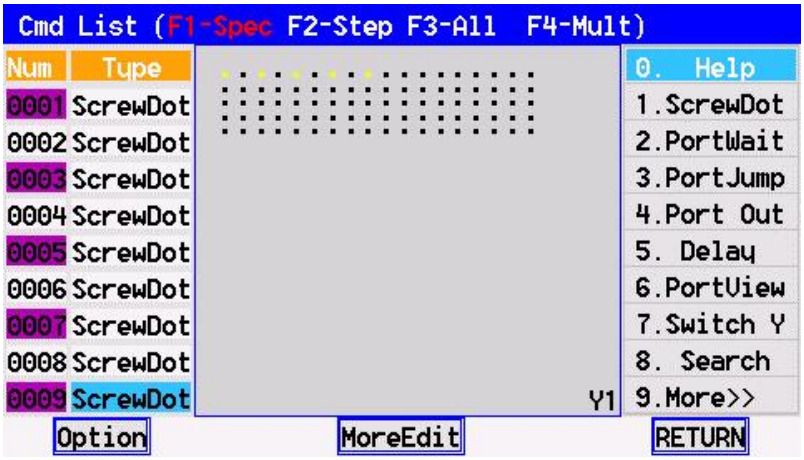
The [Move] key allows you to edit and modify the coordinates of the selected command directly.

Numeric keys 0 - 9 allow for quick programming or to open special function screens.

For example, the [number 0] key opens the help screen, the [number 6] key provides a quick overview of the IO status, and so on.

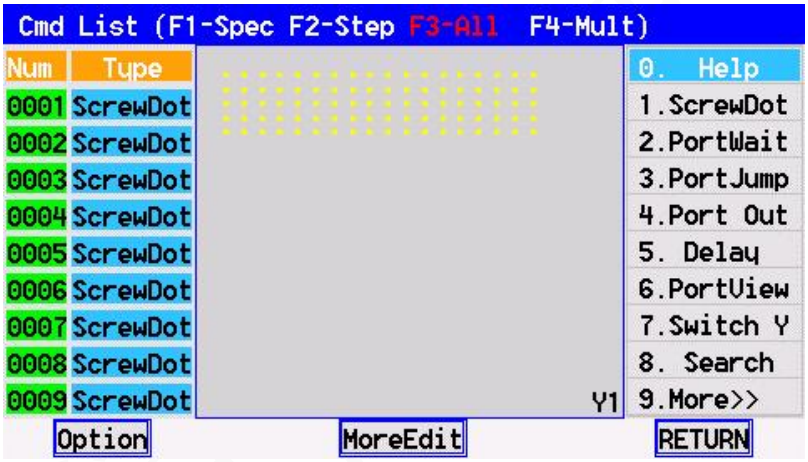
Note: A red lock icon displayed in the upper right corner of the file indicates that the file is locked, and unlocking is required to edit the file.

[F1] is a non-continuous selection command (interval selection), repeatedly pressing means canceling the selection, with a cursor prompt.

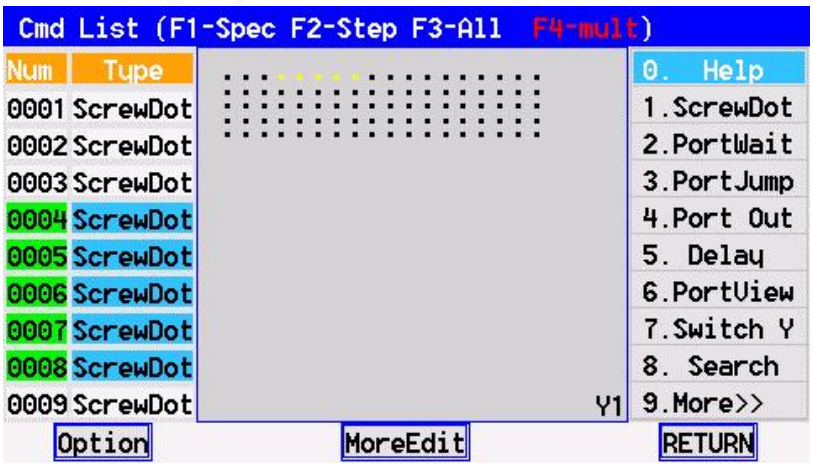


[F2] Perform a single-step screw test maneuver.

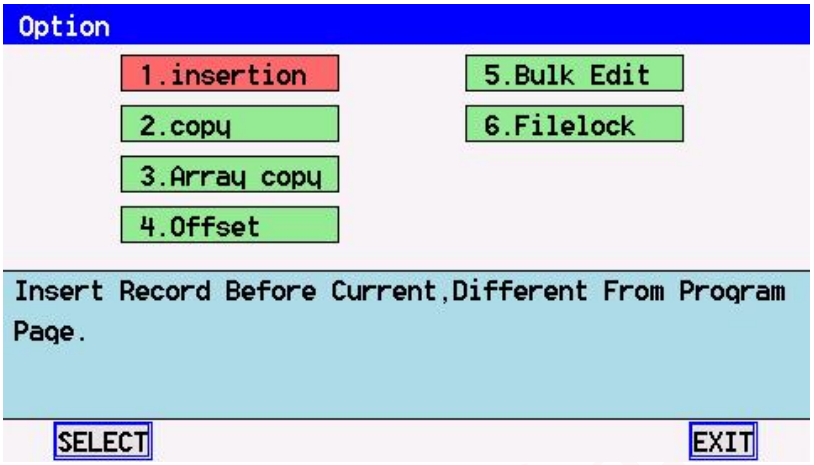
[F3] for the selection of all commands (i.e., select all), repeatedly press to cancel the full selection, there is a cursor prompt.



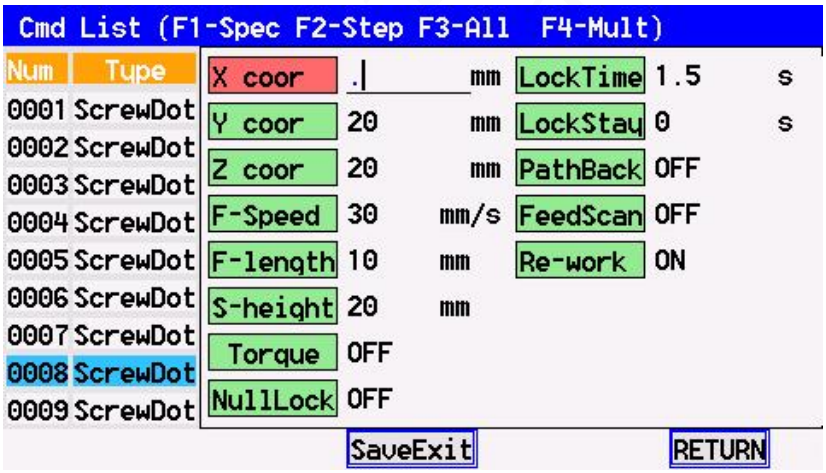
[F4] to select a section of the instruction (multiple choice), repeatedly press to cancel the multiple choice, there is a cursor prompt.



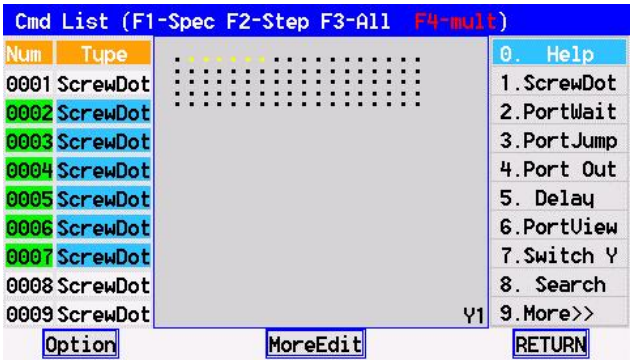
Press [Operation] to perform insertion commands, copy commands, array copy, offset operations, and batch modification operations on the selected commands (see Chapter 6 Programming Command Operation Description for details).

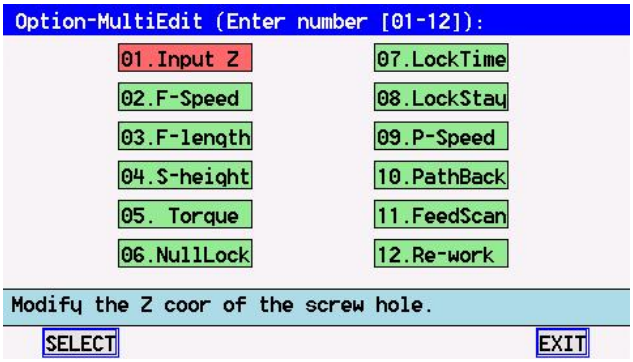


When the cursor only selected a command, press 【Parameter Edit】to enter the following dialog box, you can modify the parameters of the current command, press 【Save Exit】then the parameter modification is successful. As shown in the figure.



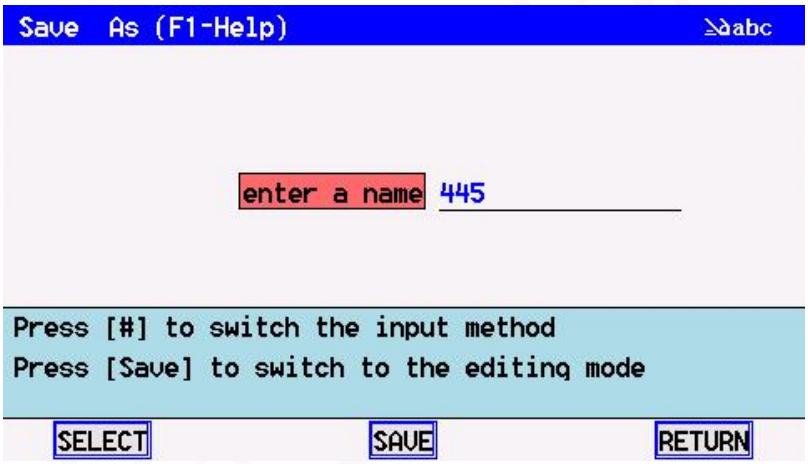
When the cursor selects two or more commands (when multi-selected or all-selected), [Parameter Edit] will change to [Batch Modify], which allows you to make quick batch modifications to the selected multiple commands. As shown in the figure.





4.4 Save as another file

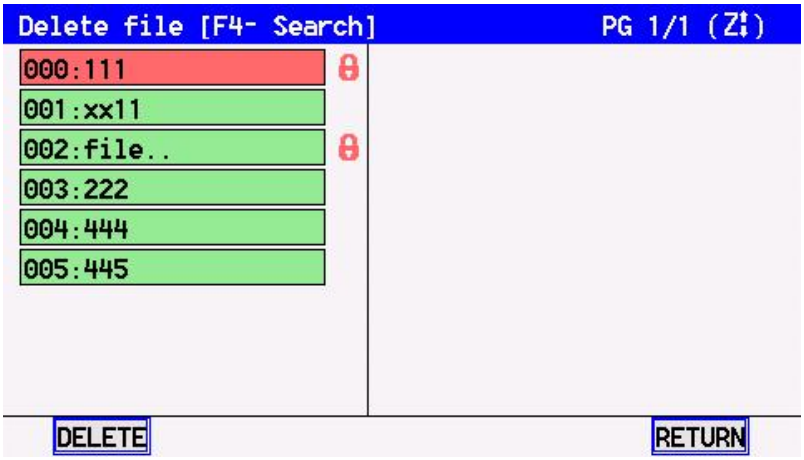
The file has been opened to save a file, enter the file name, press the [ENTER] key that the file is saved successfully; file name can be numbers and English and Chinese characters, [#] key to switch the input method, as shown below.



The [Select] key opens an existing file for overwriting and saving.

4.5 Delete file

Delete the existing file name, the right side of the interface can be a real-time preview of the contents of the programmed file to facilitate the selection, press[Delete] key that the file is deleted successfully.

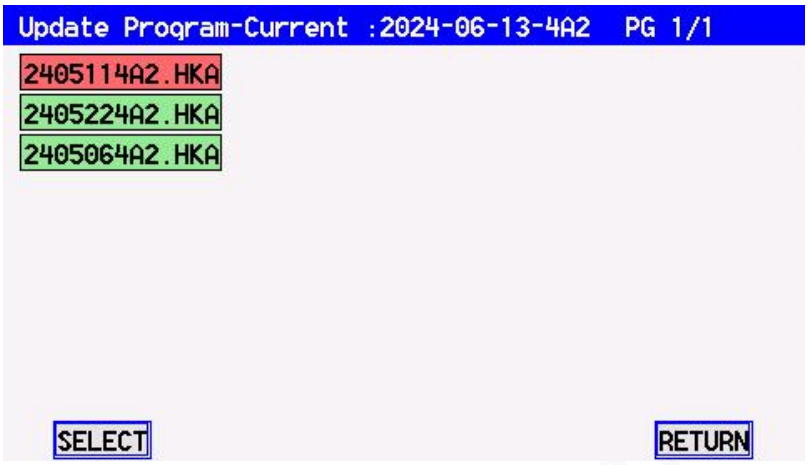


[Search] as above (4.1 open the file)

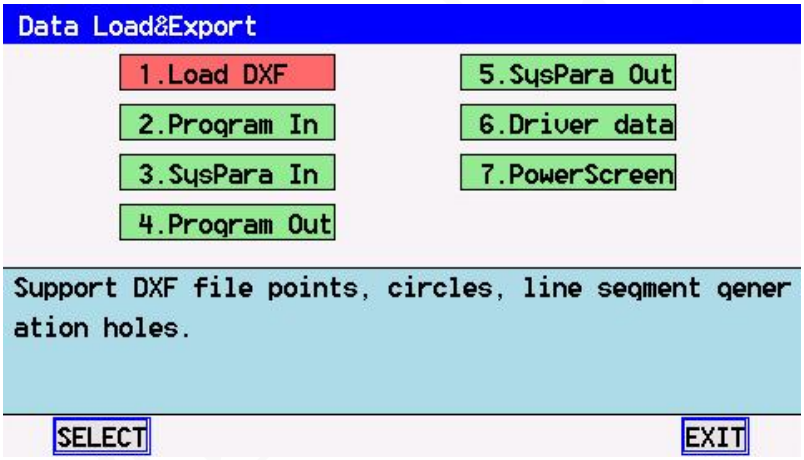
Note: Locked files need to enter a password to confirm the deletion, to prevent accidental deletion!

4.6 Parameter upgrade

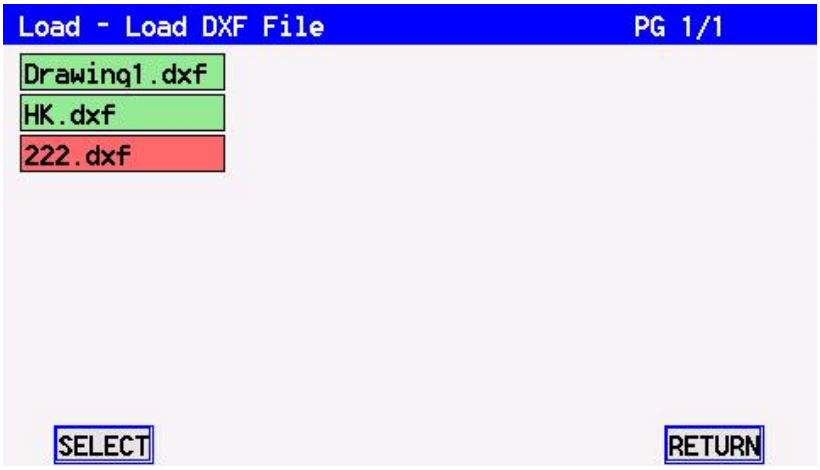
When specific features are added to the system, the system can be upgraded from a USB flash drive through this interface. As shown in the figure below.



4.7 Data Import & Export



4.7.1 DXF Import

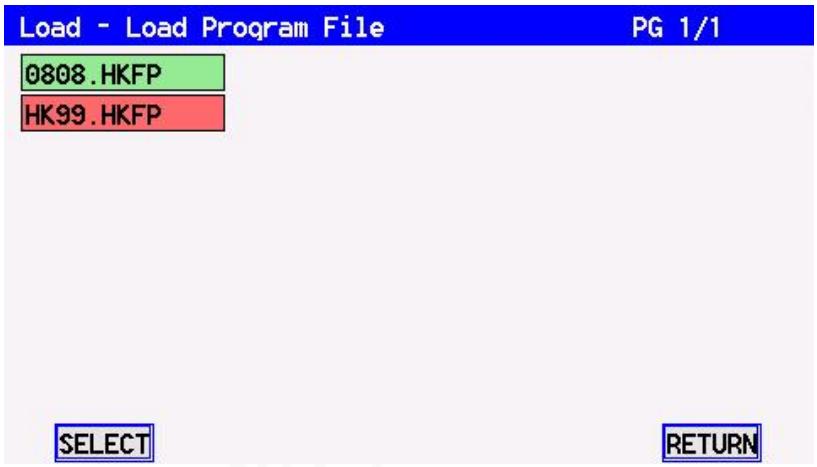


Save the AutoCAD drawing file as a file with the suffix DXF format, save it to the root directory

of the USB flash drive, and then operate the function to convert the drawing file into a screw file, and after converting the screw file, you need to correct all the points according to the actual starting position of the machine for the starting point offset can be processed and run. DXF can recognize the point graphic, the endpoints of the line segments and multiple line segments, and the circle with a radius of less than 10 for the screw hole. coordinates.

Note: When the current file is locked, you need to enter a password to confirm, to prevent accidentally overwrite the file!

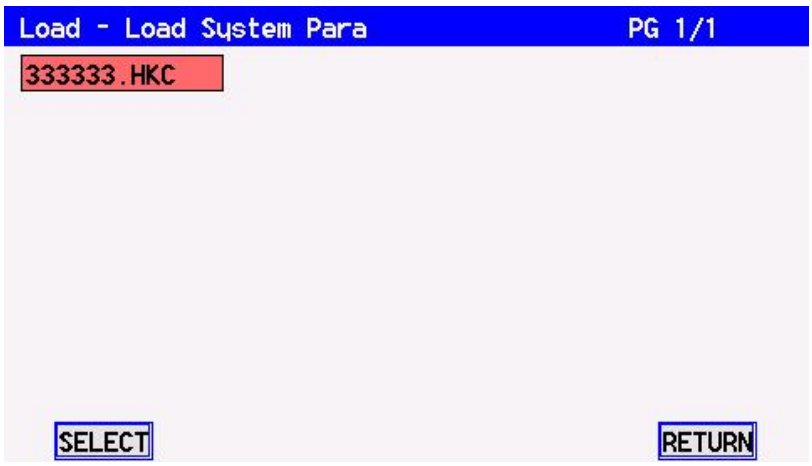
4.7.2 Load processing file



Refers to the U disk stored in the backup processing programming files, re-imported into the system, to facilitate the processing of the same product on multiple machines to avoid duplication of programming work.

Note: When the current file is locked, you need to enter a password to confirm, to prevent accidentally overwriting the file!

4.7.3 Load system parameters



Refers to the system parameter settings stored in the U disk for backup, re-imported into the system to facilitate the processing of the same product on multiple machines to avoid duplication of parameter settings.

4.7.4 Exporting parameters to USB flash drive

It means that the current machining file of the system will be exported to HKFP file and stored in the root directory of U disk for backup, which is convenient for multiple machines to process the same product and can be directly imported to other machines to avoid repeated programming work.

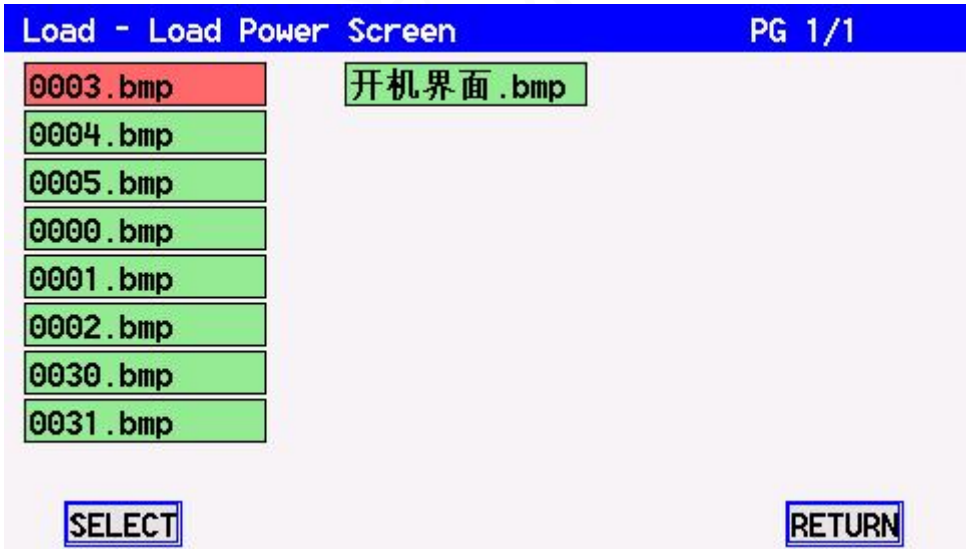
4.7.5 Export System Parameters to USB Flash Drive

It refers to exporting the current system parameters of the machine as HKC files and storing them in the root directory of the U disk for backup, which is convenient for multiple machines to process the same product to avoid duplicated parameter settings.

4.7.6 Import smart screw driver data

The system supports customized import of intelligent electric batch configuration file, the file is in CSV suffix format, according to the official sample document (the document can be obtained by contacting the technical after-sales service), combined with the actual need to define the electric batch editing parameters; after modification and import into the system, you can edit the intelligent electric batch parameters on this system.

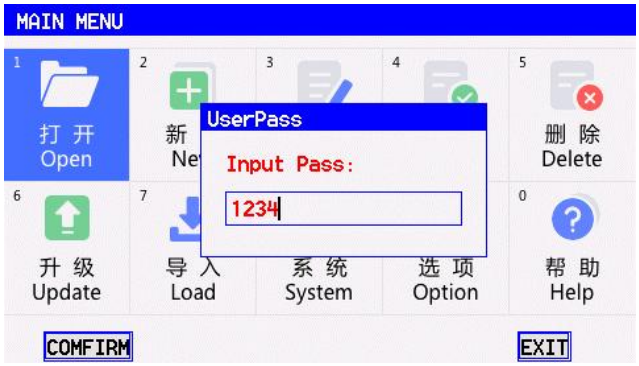
4.7.7 Load Power Screen

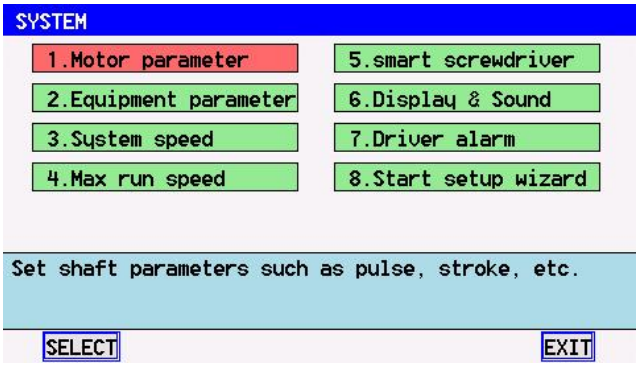


The system supports 480*272 pixels of RGB565 format with .BMP format suffix to be imported as the boot screen, the picture is put into the root directory of the USB flash disk, and then operate this menu.

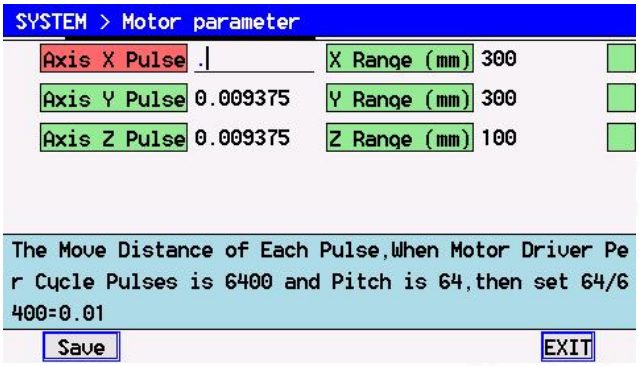
4.8 System

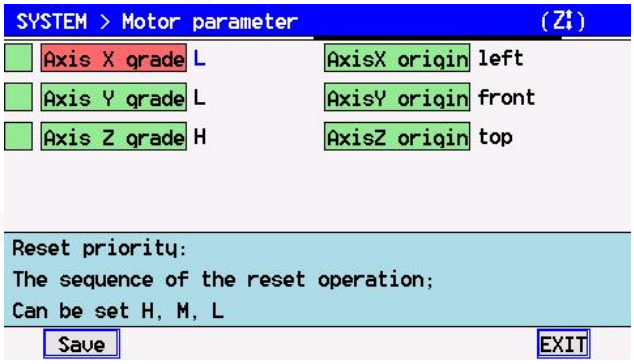
The password dialog box will pop up when you enter the system parameters interface, the default password: 1234, as shown in the figure.





4.8.1 Motor Parameter





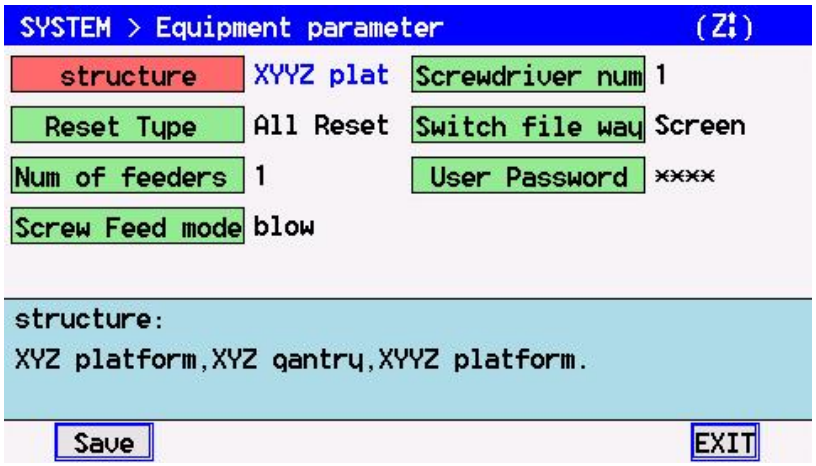
Pulse Equivalent : Pulse Equivalent refers to each pulse, the actual physical distance moved by the device, specifically available pulley circumference or screw pitch divided by the number of pulses per revolution of the motor to get.

Range: The travel of each axis is the effective travel of each axis in mm.

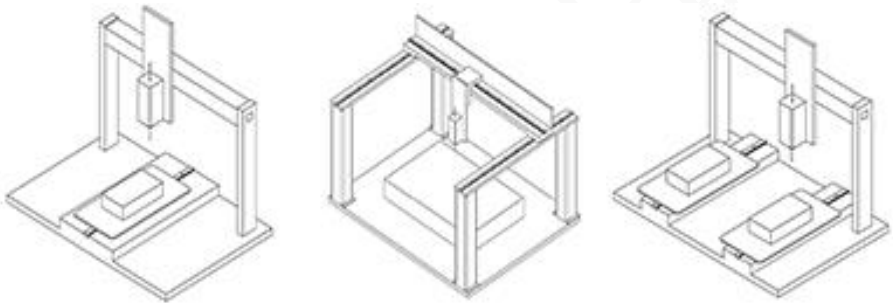
Reset Priority :means that the reset sequence is set according to the machine, and the order of reset action of each axis can be customized.

Origin direction： The home direction is set to adapt the home sensor installation position of the machine, in order to make the direction key of the hand-held box consistent with the direction of the machine movement, and to facilitate the teaching and operation.

4.8.2 Equipment Parameter



Machine Structure ： Three types of machine are available: 3-axis platform mode, 3-axis gantry mode, and double Y-platform mode.



XYZ platform　　XYZ qantry　　XYYZ platform

Reset Type： is the axis mode of automatic reset when the device is turned on.

Shield:shield the equipment origin signal, no reset action;

None: no automatic reset at power-on, manual reset is required, and all axes are involved in reset;

All reset: reset automatically when power on, all axes are involved in reset.

XY reset: automatic reset at power-on, X and Y axes are involved in reset (including Y2 axis in case of double Y).

Number of feeders： The equipment is equipped with the number of feeders, which can be set in the range of 1-2.

Screw feed mode： Standard suction: sucking screws by vacuum signal, turn on the signal when the Z-axis is falling;

Claw / magnetic suction: through the claw cylinder / magnetic suction signal to pick up the material, in the Z-axis completely reached the pick up position after the signal is turned on;.

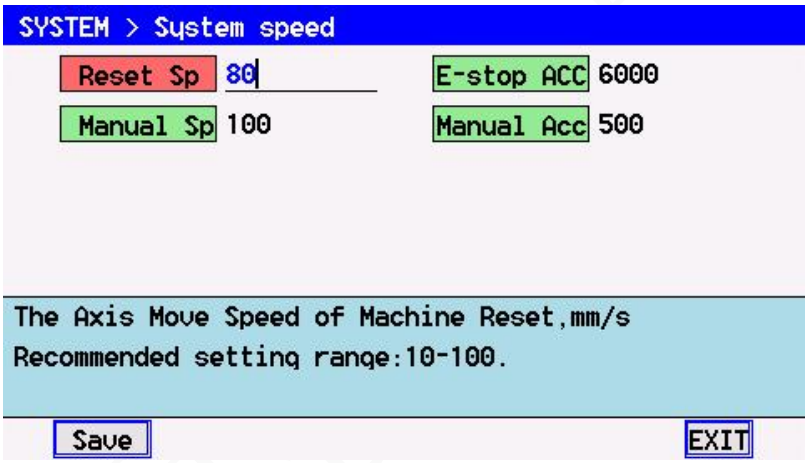
Standard blowing: blowing feeder through the air pipe to blow the screws to the head of the wrench picking method.

Number of Screwdrivers ： Set the actual number of electric batches carried by the current device, the setting range is 1-2, and only the same brand can be used for the intelligent electric batch in the multi-electric batch mode.

Switching File Mode ： Set the way of switching files, which can be switched manually by the Teach-Instructor and then switched by the external input signal.

User Password ： Set the password for system parameters, the numeric keys are valid, save the password is set successfully, the factory default password is 1234.

4.8.3 System speed



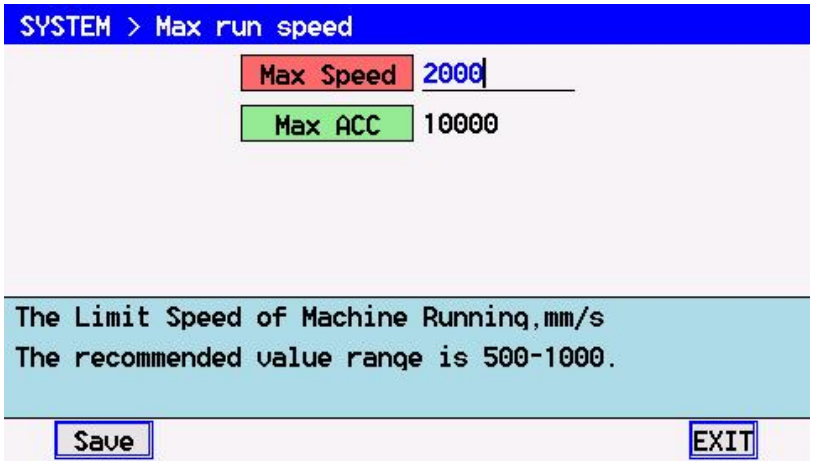
Reset Speed： refers to the speed of equipment reset, press the numeric key to input the speed, the range is 10~100, unit mm/s.

Manual Speed： refers to the maximum speed when manually moving the equipment, unit mm/s, usually set within 10~100, the medium speed and low speed are 10% and 1% of the high speed respectively.

Emergency Stop Acceleration： means the stopping acceleration when pressing the emergency stop button, unit mm/s^2; usually set within 4000~10000.

Manual acceleration： refers to the acceleration when manually moving the equipment, the unit is mm/s^2; usually set within 500 to 5000.

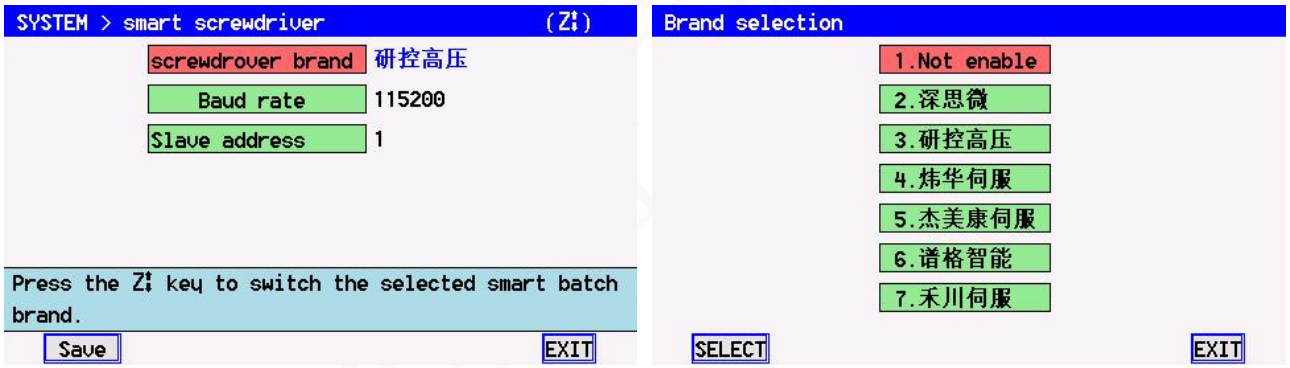
4.8.4 Maximum operating speed



Maximum Speed ： is to limit the maximum speed of the equipment, press the numeric key to input, usually 1000, unit mm/s.

Maximum Acceleration ： is to limit the maximum acceleration of the equipment operation, press the numeric key to input, unit mm/s^2.

4.8.5 Intelligent Screwdriver

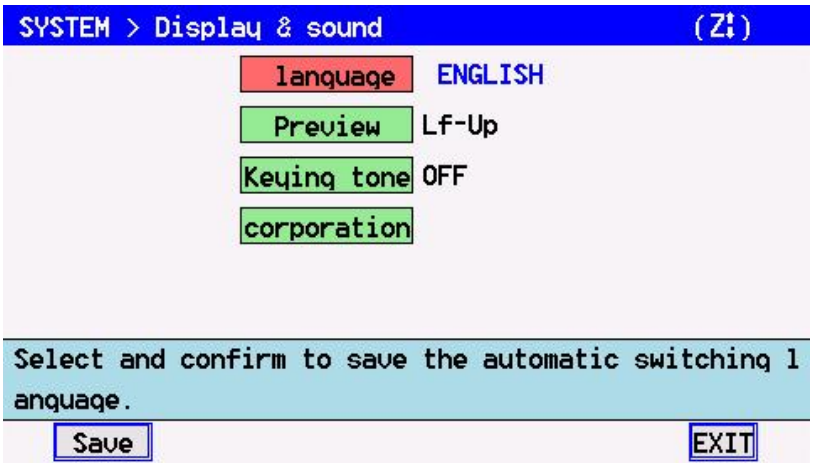


Electric batch brand：Select the brand of intelligent electric batch carried by the current equipment, if there is no brand of electric batch or parameter modification, it can be updated by importing the information of electric batch.

Baud rate： batch communication baud rate, need to match with the batch using baud rate, optional baud rate 2400, 4800, 9600, 19200, 38400, 57600, 115200 a total of 7 kinds of baud rate.

Slave Address ： Slave address of intelligent electric batch communication, need to match with the address of electric batch, can be set in the range of 1-247.

4.8.6 Display & Sound



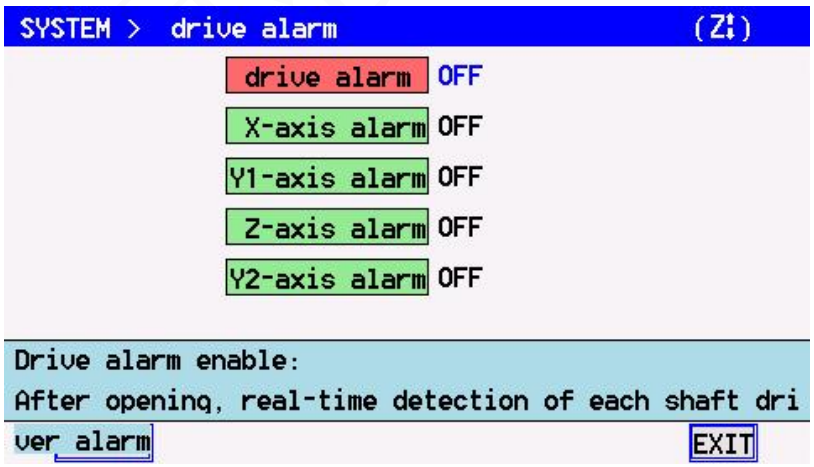
System Language： The system interactive interface using the language, select the corresponding language and press Save to switch automatically.

Preview Position： Processing file position preview map origin position, can be set to the upper left, lower left, upper right, lower right.

Key Volume： Handheld key sound switch.

Corporate name： Customize the name of the equipment or company, it will be displayed in the upper left corner of the running interface after setting, and the model structure will be displayed when it is not set.

4.8.7 Drive Alarm

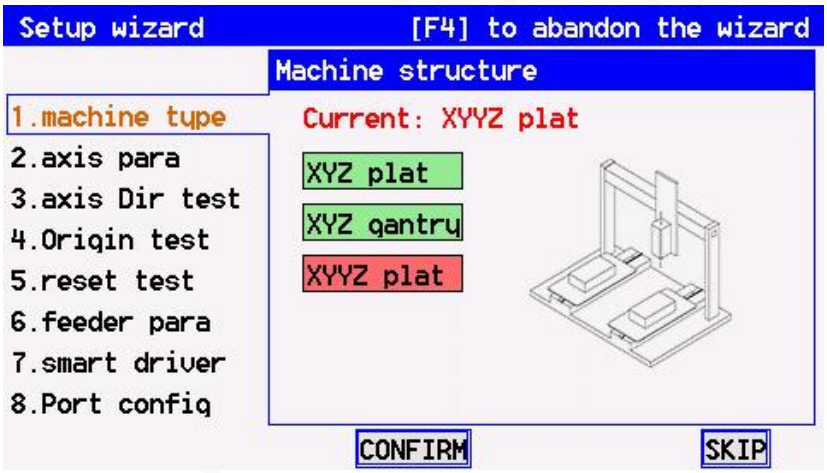


Drive Alarm： enables drive alarm detection.

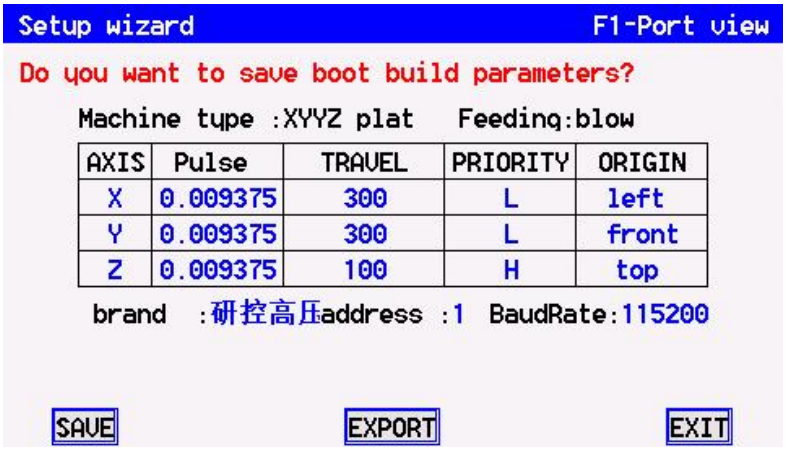
X, Y, Z, R (Y2)： axis drive alarm] Independent switch for each axis drive alarm checking.

4.8.8 Starting the Setup Wizard

After system initialization or the first time power on, automatically enter the wizard function, enter the wizard, you can choose to directly use the U disk to import parameters or follow the wizard to set. If you are already familiar with this product do not need to guide the parameter settings can be directly skipped to set their own parameters.



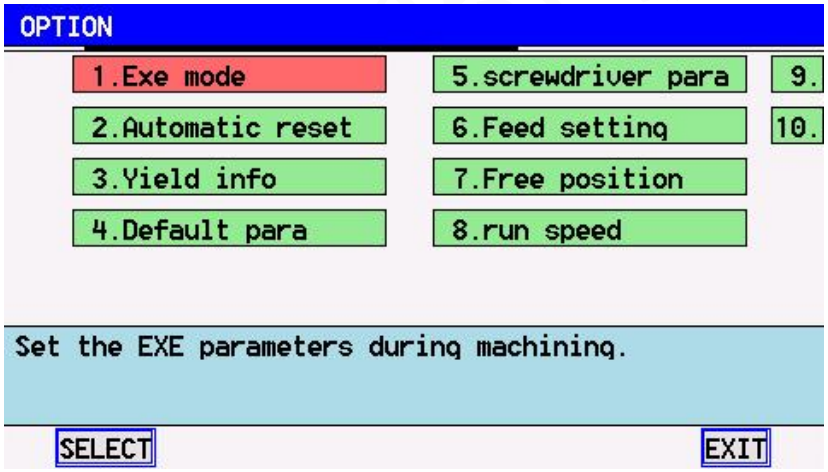
The parameter wizard includes operations such as structure, axis parameters, reset test, batch test, and IO function configuration. The [Skip] option is available for operations that you are not sure about or do not need at the moment. If you want to exit in the middle, you can press the [F4] function key to end the wizard.



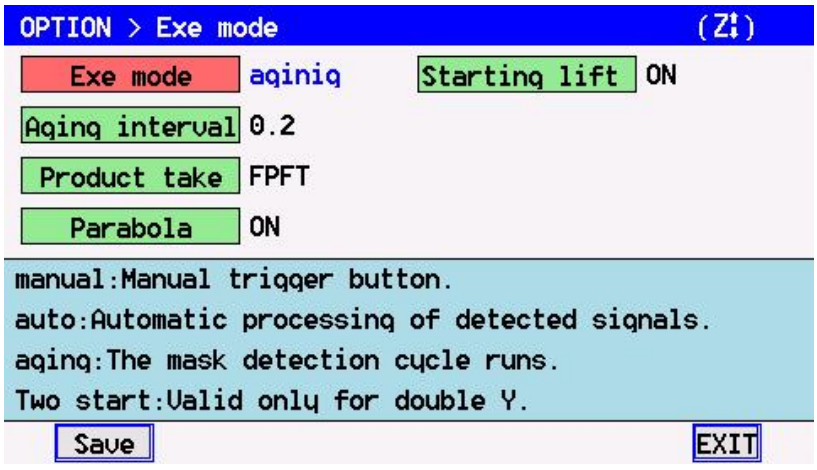
After completing the wizard, you can browse the setting results to determine whether to save or not, and at the same time, if you need to make backups for other devices you can select [Export Backup], you can backup the parameters to a USB flash disk.

4.9 Option

Used for global setup parameters that are relevant when the system is running for processing.



4.9.1 Execute Mode



Execute Mode: Setting the device operation mode:

Manual: every time you start, you need to press the start button manually; Automatic: you need to set the workpiece detection signal, only the first time you need to press the start button.

Auto: the workpiece detection signal needs to be set, only the first time to start the start button needs to be pressed, after the start when the detection signal of the workpiece is detected, it can be run automatic;

Aging: aging mode, start running automatically after pressing the start button, and shield the equipment from non-key signal detection.

Two-start: only double Y effective, double Y independent start button work, when the other side of the work press the start state can be memorized, and so on the equipment idle automatically start working.

Aging interval； Aging mode each time the interval between the start of the run time.

Product Pickup and Drop-off： Front drop and front pickup: drop off the products to be processed and pick up the finished products in front of the equipment.

Front-loading and back-loading: drop the products to be processed in front of the equipment and take away the finished products at the back of the equipment; [Product Pickup and Placement].

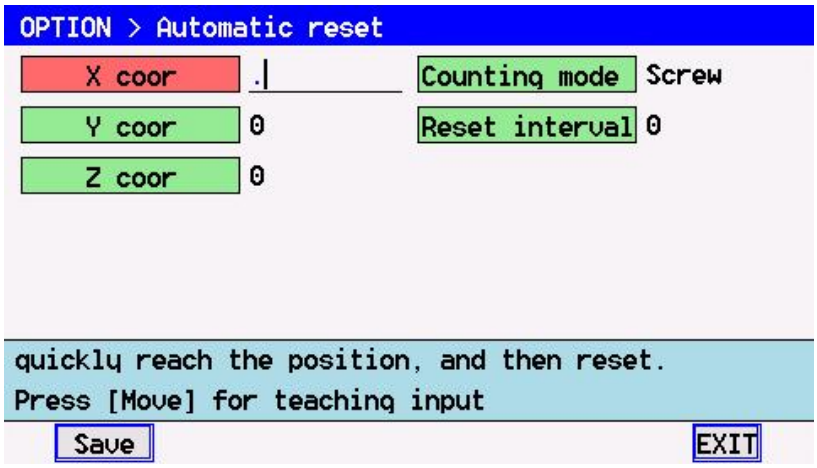
Front of the machine: Y coordinate is 0 position;

Rear of the equipment: Y coordinate is the maximum travel position.

Corner parabola： When the motion parabola is turned on, then the point-to-point action XY-axis and Z-axis will carry out parabolic interpolation action; [Lift 0 at startup] The machine will start the parabola when the point-to-point action is turned on.

Start-up lift 0： When the machine starts to run for the first time, the Z-axis will be lifted to the 0 coordinate first and then the other axes will be operated, which can prevent the Z-axis from colliding with the workpiece when the position of the Z-axis is too low before the start-up.

4.9.2 Automatic reset

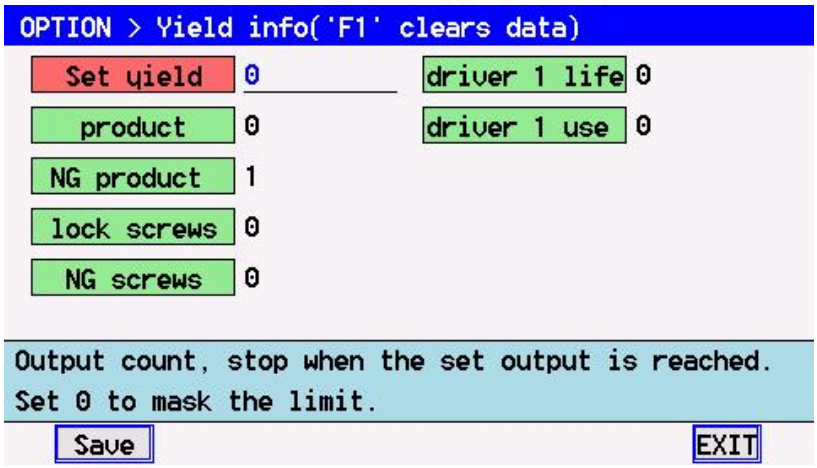


Quick reset coordinates： When resetting during operation, it can quickly return to the coordinates close to the origin.

Counting mode： Automatic reset counting mode, hole counting and product counting can be set.

Reset Interval： Automatic reset interval cycle.

4.9.3 Yield Information



Set Yield： Preset work output, production to the set output value, stop prompting, set 0 off function.

Production Current ： The number of products completed by the current equipment.

Products NG： The number of NG products processed by the current equipment.

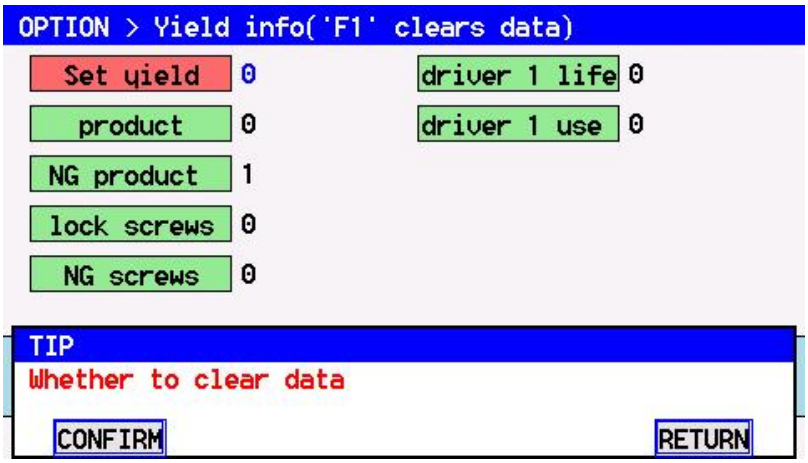
Locking Screws： The number of locking screws completed by the current equipment.

Screw NG] The number of NG screws locked by the current equipment.

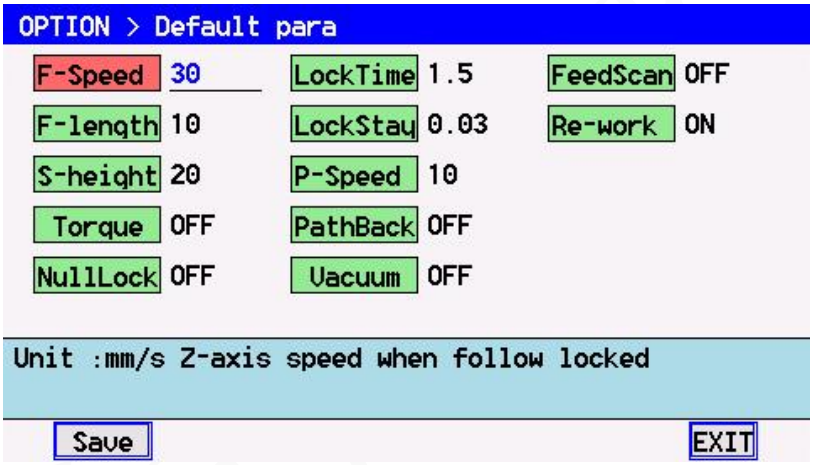
Life span of Batch 1： Set the maximum number of times Batch 1 can be used, and stop the machine after the number of times has been reached.

Electrical Batch 1 Usage ： The current number of times the electrical batch 1 has been used.

Note: Press F1 to clear the production data.



4.9.4 Default parameter



Follow up speed: the speed at which Z-axis follows the screw in and down when performing the follow up action.

Follow-up length: the length of Z-axis following the screw down after reaching the screw hole position, generally set to be slightly longer than the screw length.

Safe Height: The safe height above the screw hole position.

Torque Detection: Whether to detect the torque completion signal switch when lock attached.

No screw null locking: direct locking attachment without picking up the material.

Locking time: Timing will be started after Z-axis follow up is completed, if there is no torque detection, the locking will be delayed until the completion of the locking, if the torque detection is turned on, the torque completion signal needs to be detected within the locking time, otherwise, the alarm will be “slippery teeth”.

Lock stay: the stay time after completing the lock attachment.

Avoidance speed: the moving speed from avoidance point to avoidance point or from avoidance point to screw hole point.

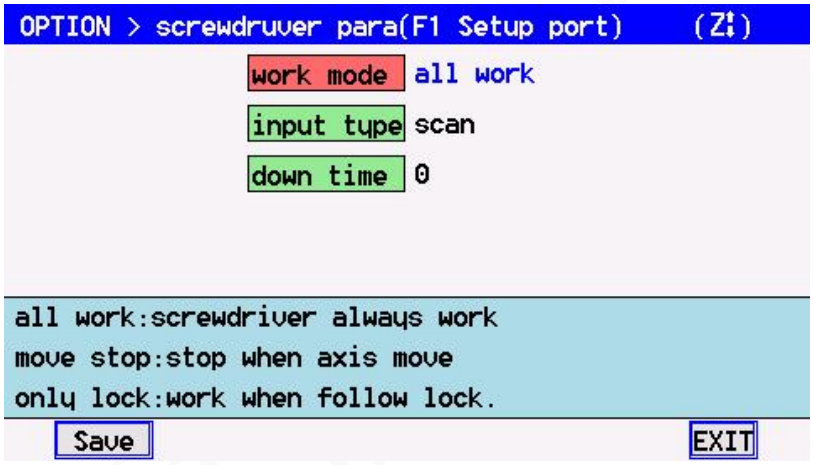
Avoiding Leaving: Whether to return and leave according to the avoiding path after locking is completed.

Vacuum checking: whether to check the vacuum checking switch when moving after picking up material.

Feed Check: The material detection switch when feeding.

Repeat feeding: Whether to re-feed or not when processing NG.

4.9.5 Screwdriver parameters



Work mode: set the rotation mode of the electric batch in the process.

All work: the electric batch start signal keeps outputting from the start of picking up material to the completion of locking attachment;

Movement stop: the electric batch signal is output during the execution of picking and locking follow-up action, and stops during the movement of the axis;

Following rotation: turn on the rotation only when the batch head reaches the starting position of following;

Electric batch torque signal: set the signal acquisition mode of electric batch torque completion, which can be set to capture and scanning modes.

Capture: Capture a rising or falling edge signal.

Scanning: means to detect an ON or OFF signal.

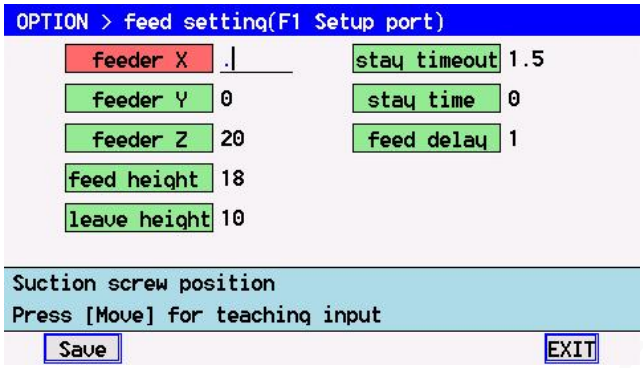
The setting should be made according to the type of torque completion signal output. If the torque

completion signal is a momentary signal, set it to Capture; if it is a holding signal, set it to Scan. Some batches produce very short-lived interference signals, which can be filtered out by using Scan mode.

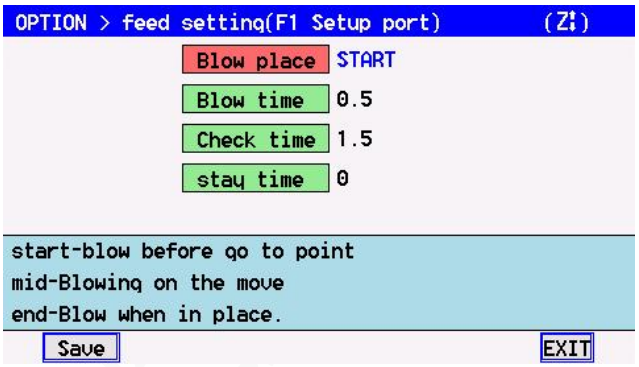
Note: Only ports 5-8 are supported in capture mode!

Upper and Lower Cylinder Delay: the time for the upper and lower cylinders of the motor to move.

4.9.6 Feed setting



Suction mode dosing parameter



Blow Mode Feeding Parameter

Feeder Coordinates： The coordinates of the feeder in suction mode, press the MOVE key to teach the coordinates;

Safe feeding height: The safe height to be lifted to feeder in suction mode; [Safe leaving height] The safe height to be lifted in Z-axis in suction mode.

Safe Height for Leaving: Safe height when the Z-axis is lifted in suction mode, equivalent to the length of the screw.

Timeout Detection Time]：The time to wait for the feeder's screw ready signal at the pickup position in suction mode, no signal will alarm if timeout is exceeded, and set 0 for unlimited waiting.

Feeding stay time： after the completion of feeding, stay in place to stabilize the delay time;

Feeding delay time： The action time when the feeding cylinder performs pushing out or returning action in suction mode, and the detection signal timeout time when there is an in-situ or in-place signal. [Blow Timing] The timing of the screw request signal in the blow mode can be set to start, midway, or end.

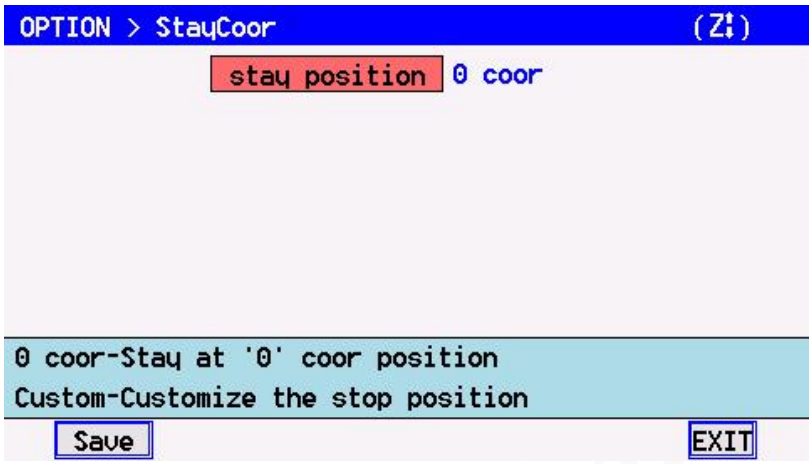
Start - Request for screws when the axis starts to move.

Midway - Screw is requested during the movement.

End - Screws are requested when the locking position is reached.

Screw request time: The duration of the screw request signal in the air blow mode.

4.9.7 Free position



Idle stop: Reset/stop position after completion of operation.

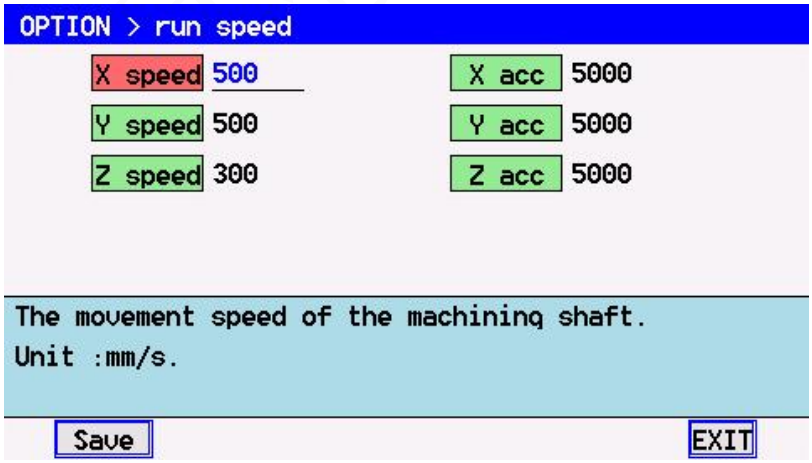
Position 0: 0 coordinate position; Customize: Set the stop position after reset/finish of operation.

Free Standing: Stopping position after reset/finish of operation;

Stop Coordinate: Idle stop position;

Reset Complete Signal Hold: Reset complete signal output time.

4.9.8 Running speed



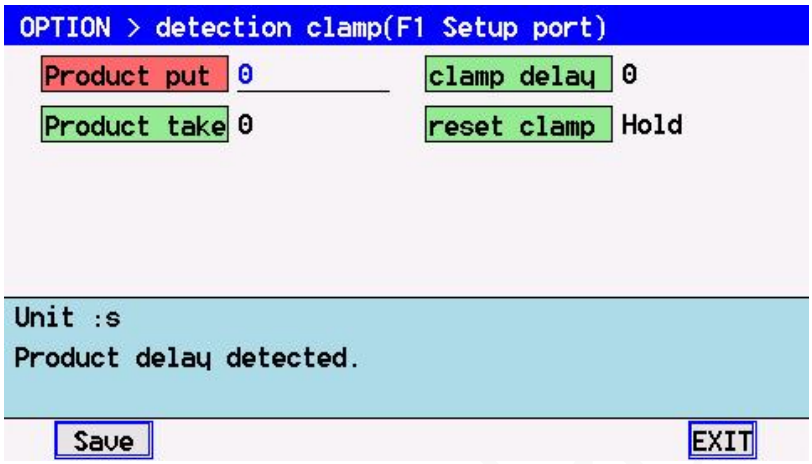
Running speed: The moving speed of the movement axis during the machining process, unit: mm/s.

Running Acceleration: Acceleration of the movement axis during machining, the greater the running acceleration, the higher the machine efficiency, but the greater the mechanical jitter, unit: mm/s.

4.9.9 Intelligent electric batches

When the Smart Batch is turned on, the parameters of the Smart Batch can be viewed and modified. To use this function, you need to select the corresponding batch in [System - Smart Batch] before setting.

4.9.10 Clamping detection



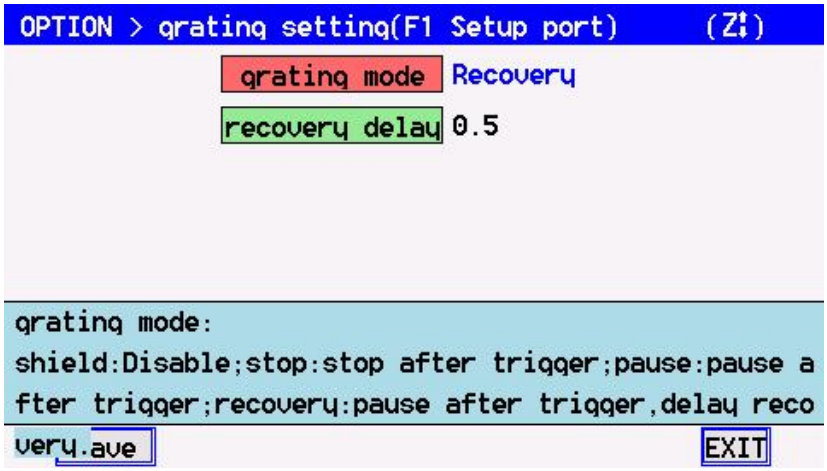
Product down delay： After setting the detection signal of workpiece, it is necessary to delay the time after the product is detected to be put down before starting the equipment.

Clamping Cylinder Delay： After setting the workpiece detection signal, after detecting that the product is removed, it is necessary to delay the time before subsequent processing.

Clamping Cylinder Delay： Delay the action of the clamping cylinder;

Clamping during reset ： The attitude of the clamping cylinder during the reset action can be set to clamp, loosen or save the original state.

4.9.11 Grating Settings



Grating Mode： The grating working mode of the device can be set to stop, pause and self-resume

mode.

Stop - the device stops working after triggering;

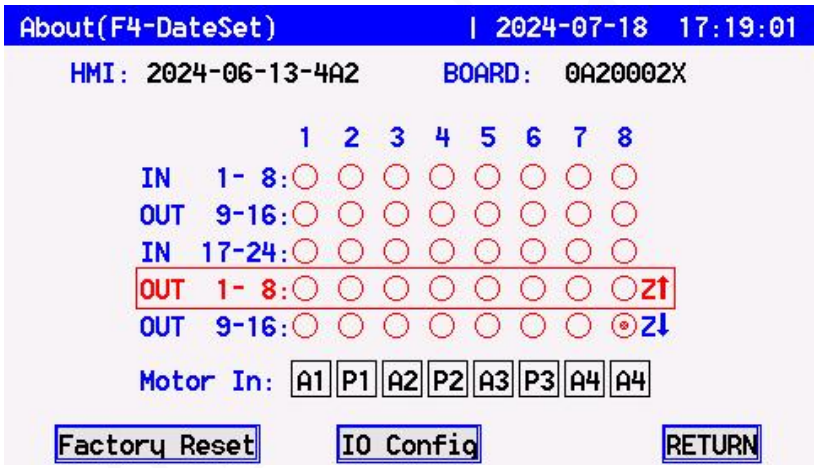
Pause - triggered equipment pause, after lifting the grating trigger need to manually press start again to continue to run;

Self-resuming - after triggering the device pause, after lifting the grating trigger delay customized time to resume operation;

Self-resumption delay： grating self-resumption mode, trigger and then lift the grating, the device to resume action delay.

Independent grating ： only double Y mode is effective, so that the grating 1 and grating 2 were independent control Y1 operation and Y2 operation, can not interfere with each other.

4.10 About



1. Viewable program version number;

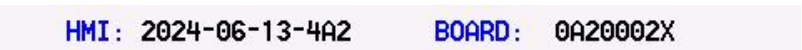
2. input status view and output test;

3. restoring factory settings;

4. configuration of system clock and setup of restricted use function;

5. IO port function configuration.

4.10.1 Version View

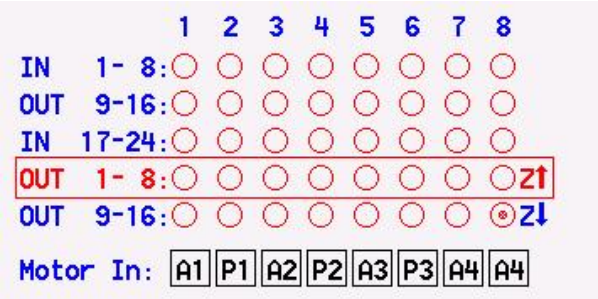


The program version indicates the current control system software version:

HMI: current software version

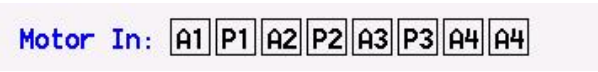
BOARD: running control library version

4.10.2 Input status viewing and output testing



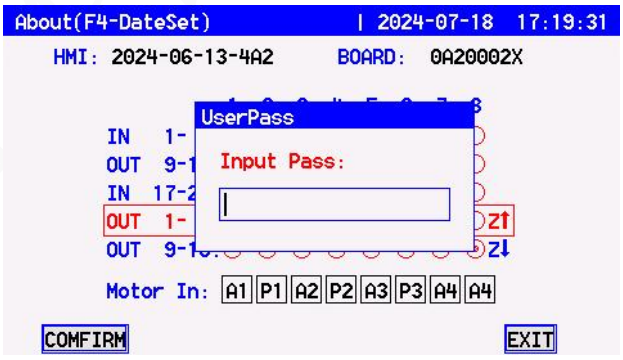
Port Idle Status:O Port Trigger Status:⊙

The red rectangular box indicates that the output group is currently selected, and the output group can be switched by [Z ↑] and [Z ↓]; after the output group is selected, the corresponding output status can be controlled by pressing the numeric keys 1-8.



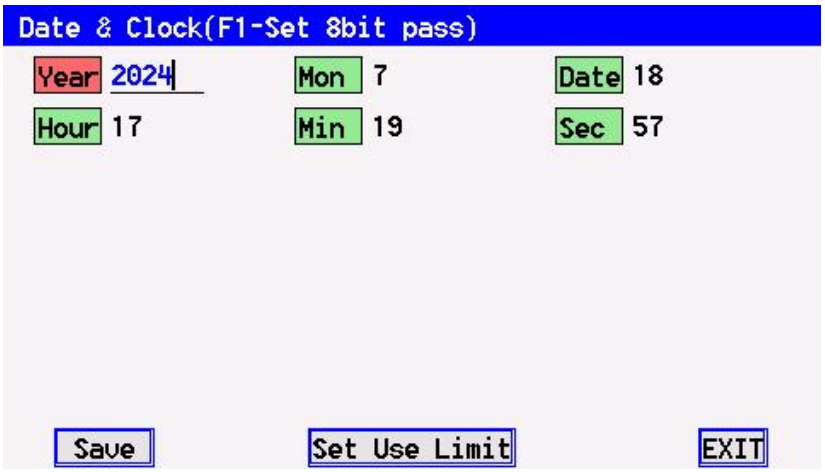
The motor signal indicates the current alarm signal trigger status of each axis.

4.10.3 Restore Factory Setting



Press [Restore Factory] button to restore factory settings, password verification is required to restore factory settings.

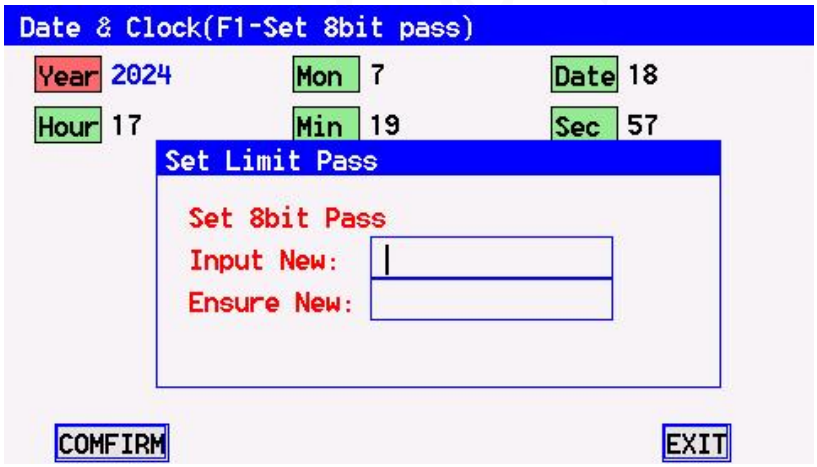
4.10.4 Time settings



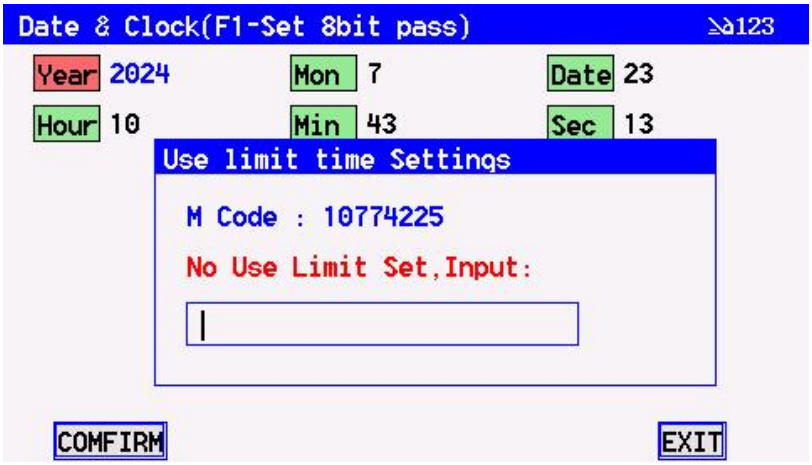
Press [F4] key for time and date configuration

This function allows you to modify the device system clock as needed or at the current time. Modification in the state of setting restrictions on the use of the time limit password verification is required.

Time limit password setting: press F1 key can set or modify the time limit password.

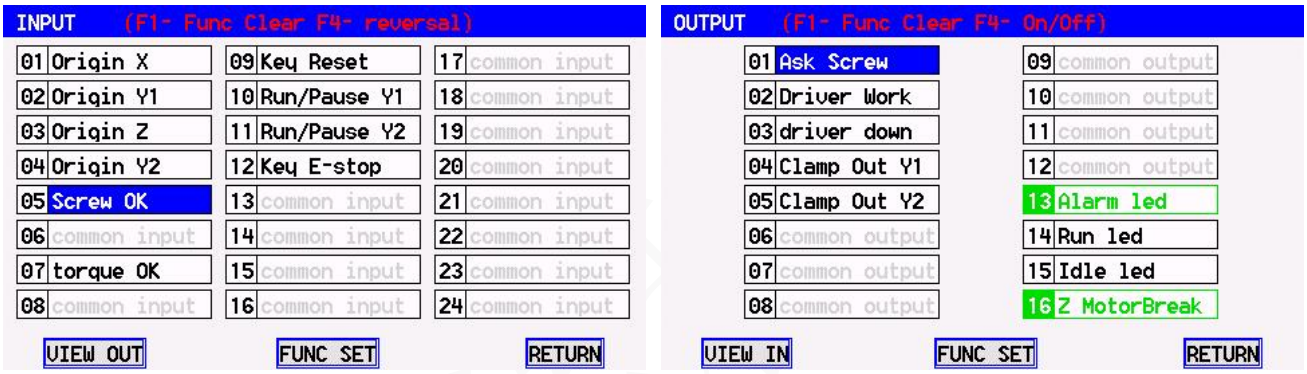


Limit Time: Press ENTER to set the limit time.



4.10.5 IO Configuration

Press the [IO Configuration] key for IO configuration, password authentication is required.



View Output/ View Input: can enter the input/output port page switching.

[F1] key can clear the configured functions, the origin signal cannot be cleared;

[F2] key can invert the input port signal, which is equivalent to reversing the logic of the input signal;

[F4] key can test the selected output port;

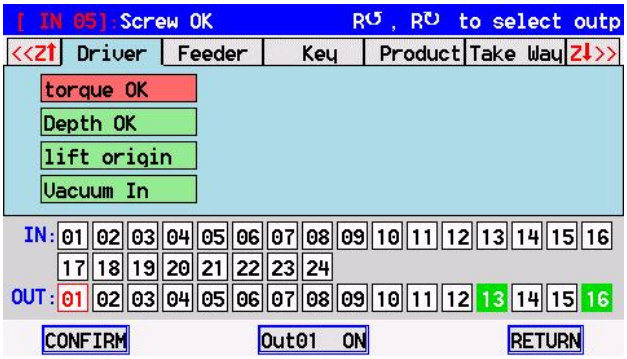
Function Setting: Entering the interface of port function selection

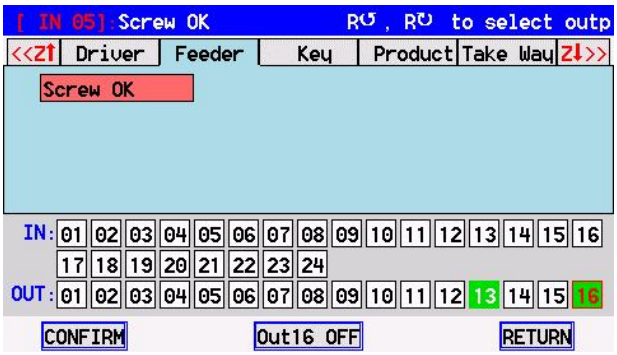
In the port function selection interface, today through the [Z ↑] and [Z ↓] key for function major categories of menu switching;

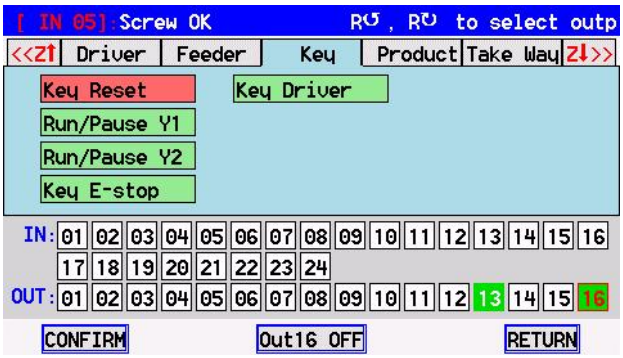
After finding the required menu sub-materials, use the [←X], [X→], [Y ↑], [Y ↓] keys to move the cursor up and down, left and right to select.

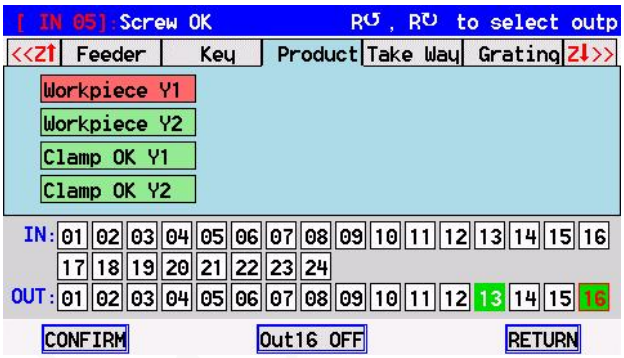
Need to carry out output test during function selection, you can use [R↺] and [R↻] keys to select the corresponding output port, and then press [open outxx] or [close outxx] key to control.

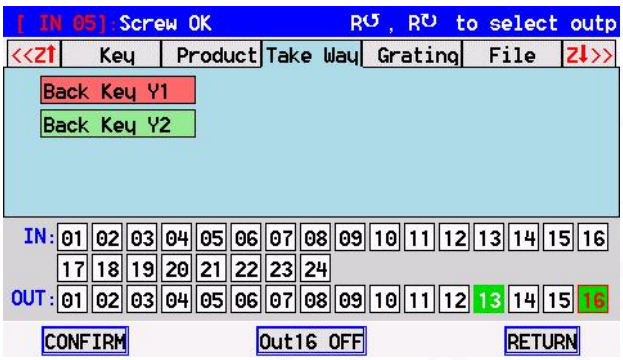
Input Port Function.

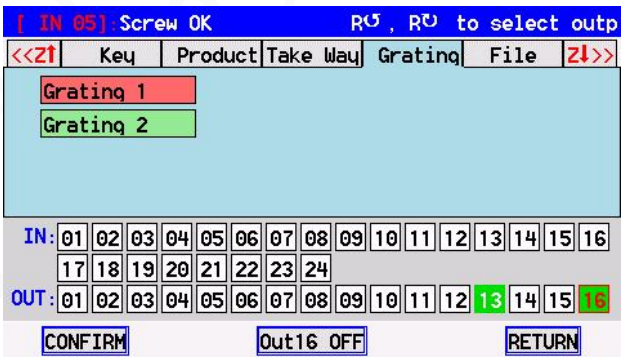


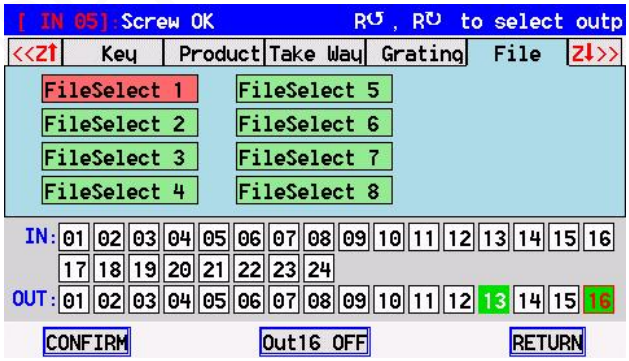




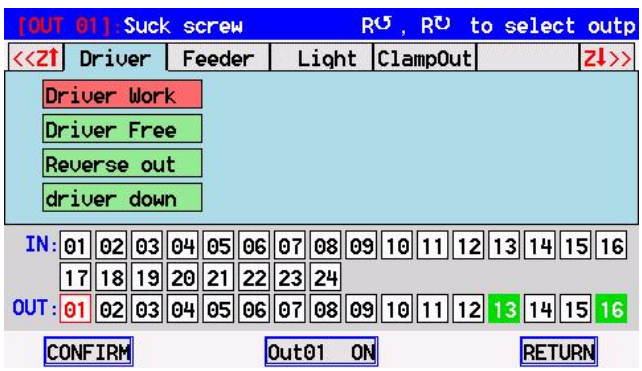


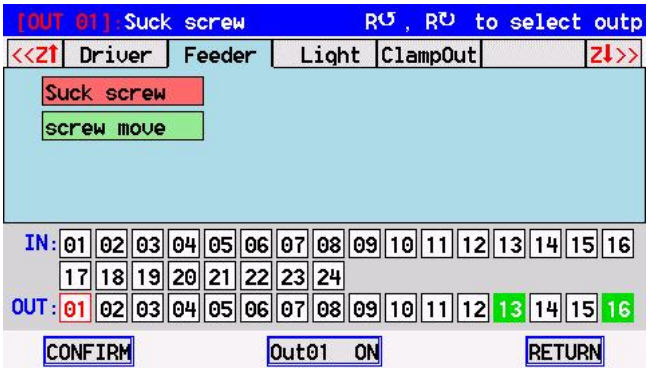


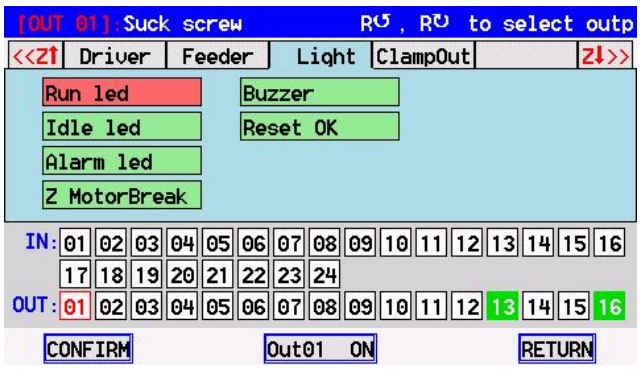


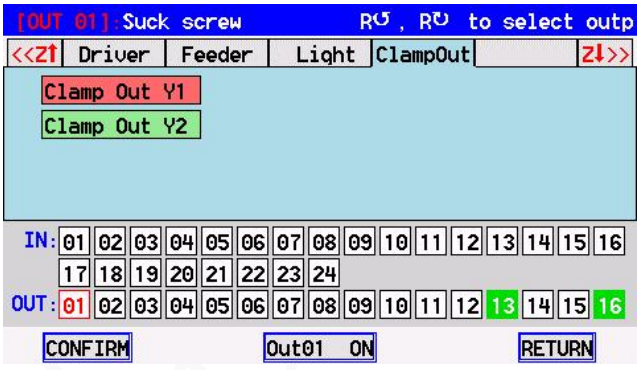


Output Port Function.


[OUT 01]:Suck screw
to select outp
<<Z↑
Driver
Feeder
Light
ClampOut
Z↓>>
Driver Work
Driver Free
Reverse out
driver down
IN: 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
OUT: 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16
CONFIRM
Out01 ON
RETURN

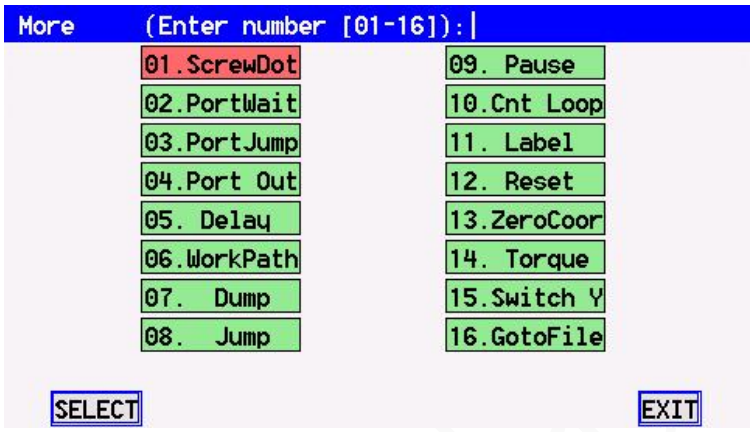

[OUT 01]:Suck screw
to select outp
<<Z↑
Driver
Feeder
Light
ClampOut
Z↓>>
Suck screw
screw move
IN: 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
OUT: 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16
CONFIRM
Out01 ON
RETURN


[OUT 01]:Suck screw
to select outp
<<Z↑
Driver
Feeder
Light
ClampOut
Z↓>>
Run led
Idle led
Alarm led
Z MotorBreak
Buzzer
Reset OK
IN: 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
OUT: 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16
CONFIRM
Out01 ON
RETURN


[OUT 01]:Suck screw
to select outp
<<Z↑
Driver
Feeder
Light
ClampOut
Z↓>>
Clamp Out Y1
Clamp Out Y2
IN: 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
OUT: 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16
CONFIRM
Out01 ON
RETURN

Chapter 5 Editing Interface Programming Instructions Description

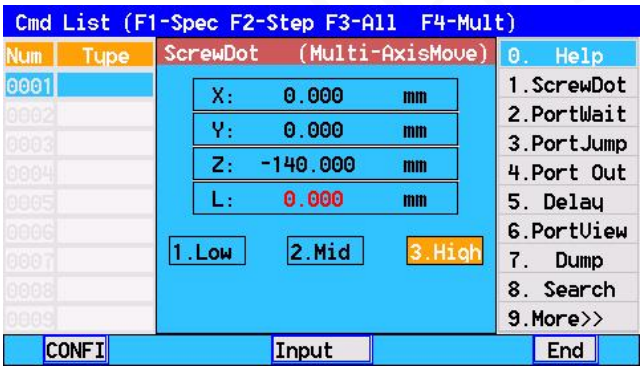
Press the numeric key [9] in the editing interface to enter the more interface, that is, the command list of all the programming points, you can directly enter the number in front of the command to select, but also the direction keys to select.

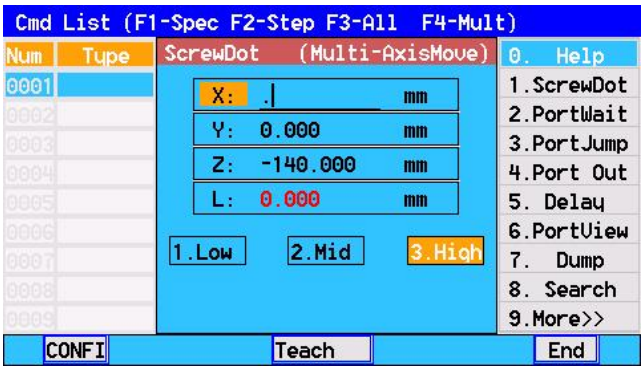


5.1 Screw Dot

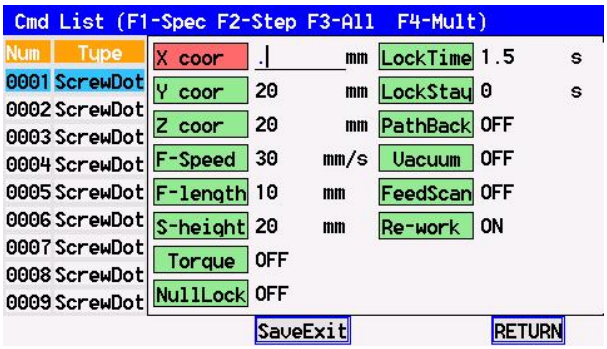
Screw hole position: the target position of the attached screw, its coordinates can be moved by the arrow keys to teach, or press [Move] to directly enter the coordinates.

Press [enter] to add a new screw hole position successfully, the screw hole position can be taught continuously until press [End] to exit the mobile interface.



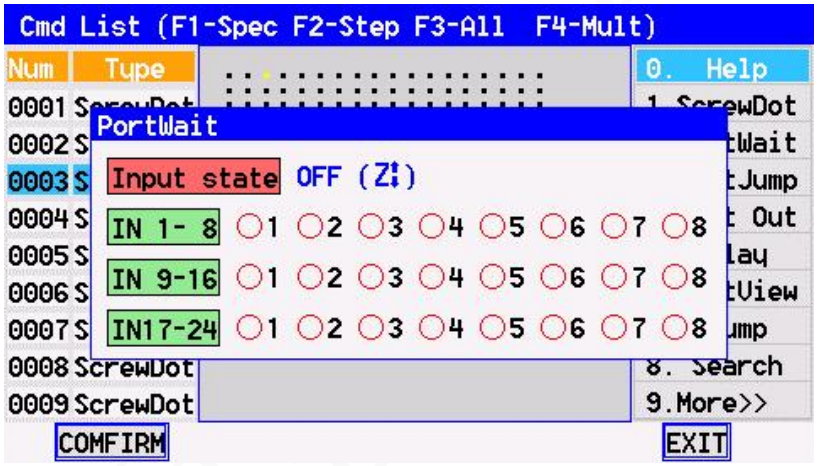


Programming styles and quick modifications.



5.2 Input wait

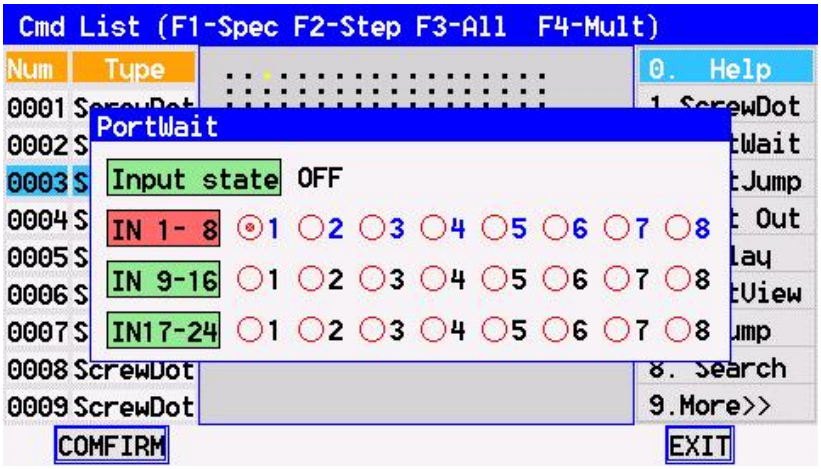
Means that after running to the line, the device pauses and waits for the input condition to be met to continue execution.



Input State: The input state required to satisfy the condition.

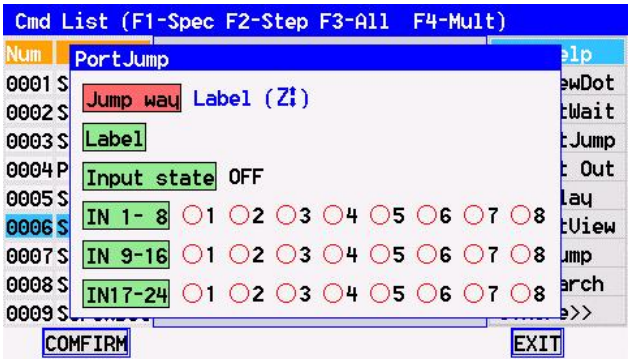
Input 1-24: Ports to be detected to fulfill the condition.

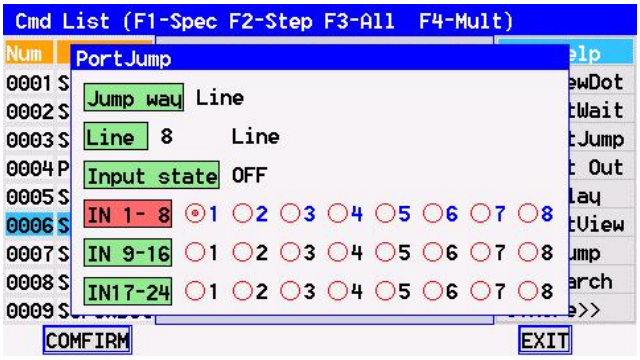
Programming Style and Quick Modification.



5.3 Input Jump

The input jump instruction is used to jump to the set address/label to continue operation when the input condition of the line is satisfied.





Jump Mode: the way to find the jump target position after meeting the jump conditions, you can choose to jump directly by line number or find by label.

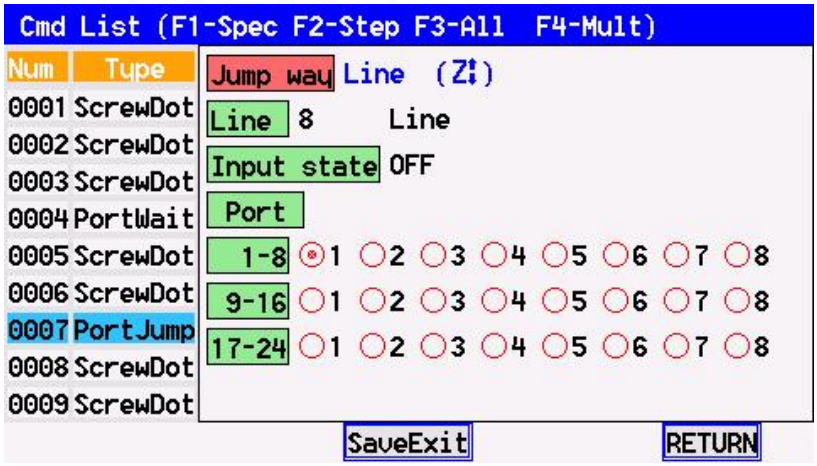
Jump label: the target label to be jumped when the condition is met.

Jump line number: the target line number to be jumped when the condition is satisfied in the line number jump mode.

Input State: The input state required to fulfill the condition.

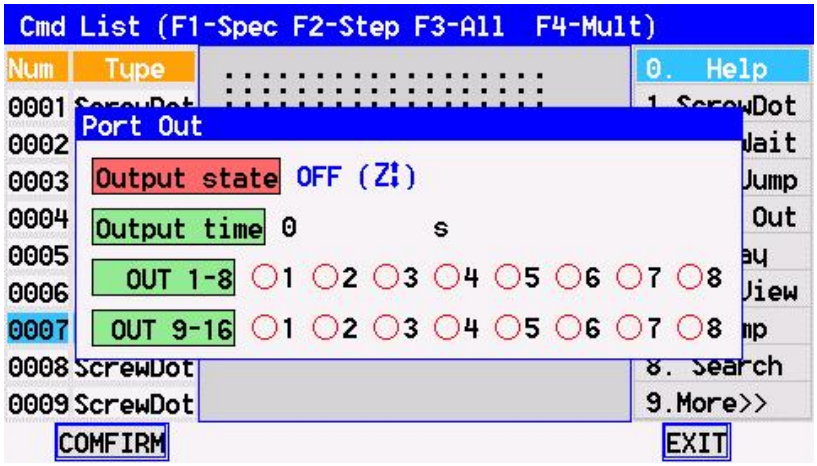
Input 1-24: The port to be detected to fulfill the condition.

Programming Style and Quick Modification.



5.4 Output Programming

Means that when execution reaches this output instruction, the specified IO port is turned on/off and delayed for a set period of time before execution continues.

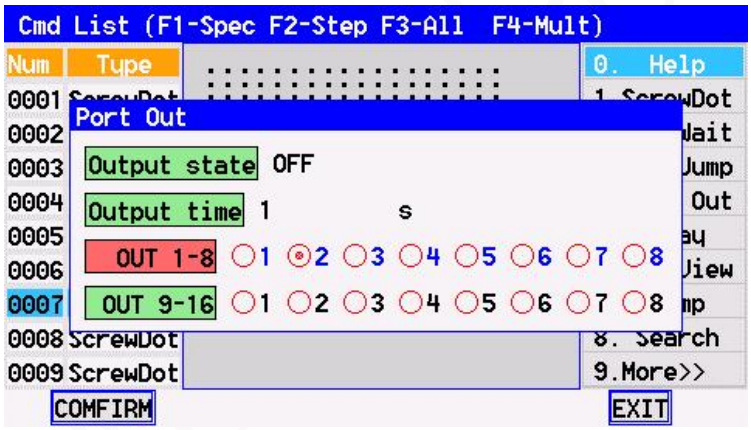


Output State: The output state to be activated when executing this line of instruction.

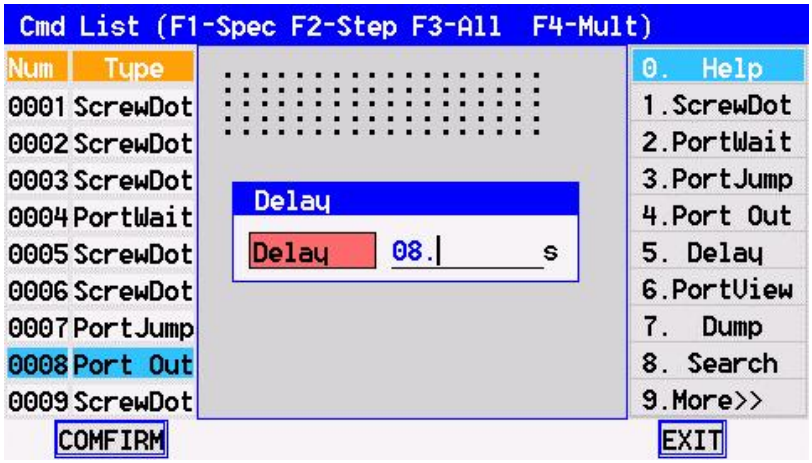
Output time: Duration of the output state after execution.

Output 1-16: The output port to be controlled when executing this line of instruction.

Programming Style and Quick Modification.



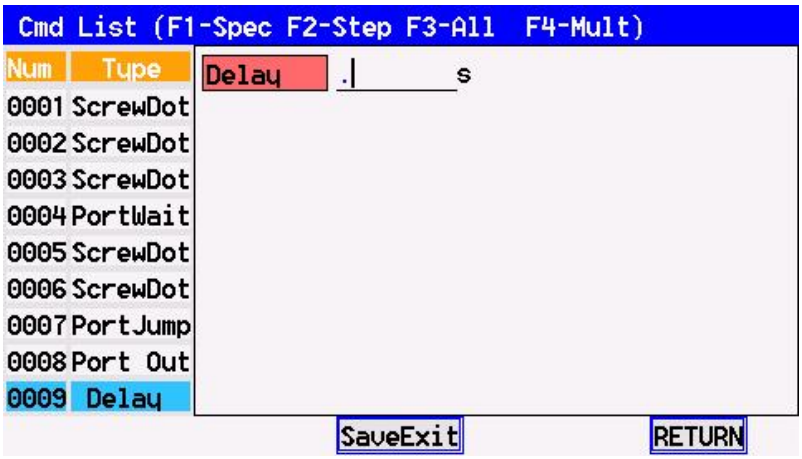
5.5 Delay



Delay: Program execution is delayed for a set amount of time up to that line of instructions and then

continues to run.

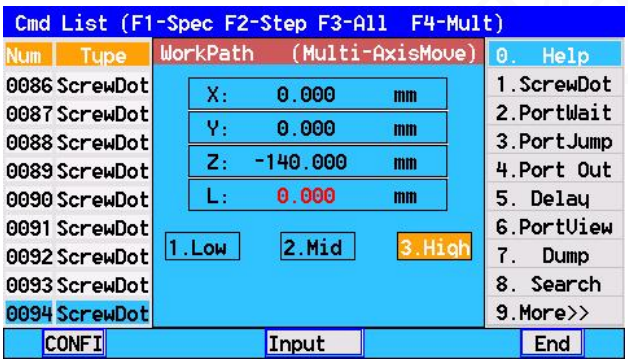
Programming style and quick modification.

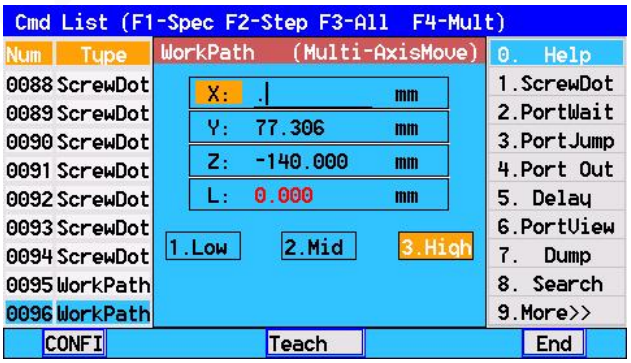


5.6 Work path

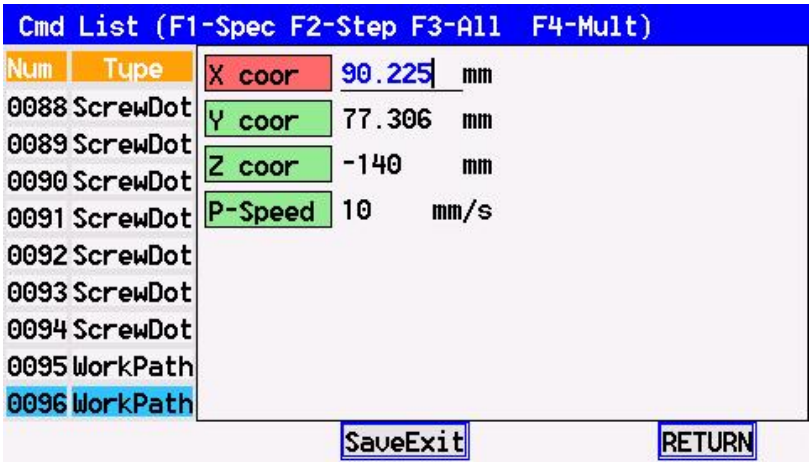
Work path: The function is to adjust the path for the screw holes with obstacles or collision risks on the moving path, and its coordinates can be moved by the arrow keys to teach, or press [move] to input the coordinates directly.

Press [enter] to add new obstacle avoidance point successfully, you can continuously teach obstacle avoidance point until you press [end] to exit the mobile interface.





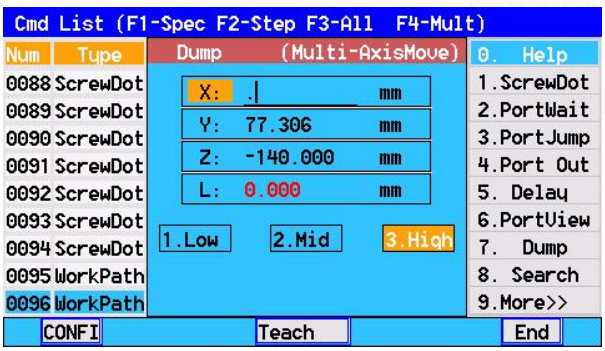
Programming styles and quick modifications.

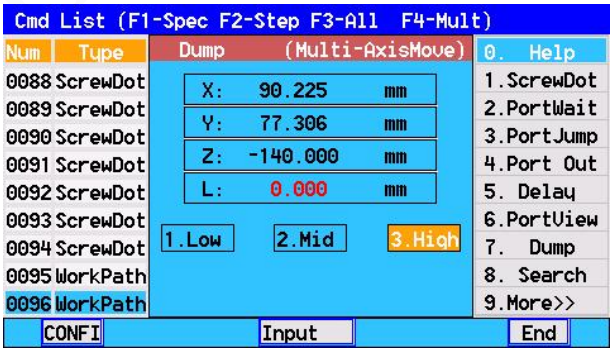


5.7 Specify coordinate position

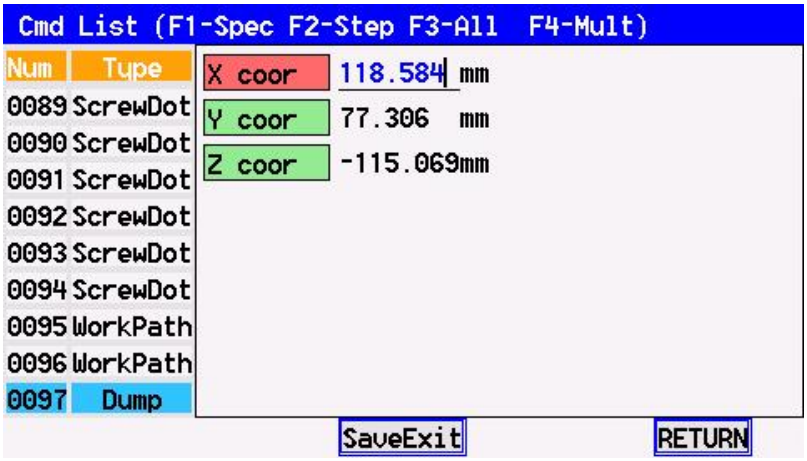
Specify coordinate position: The sub-function is to move the motion axis to the specified coordinate position, which can be paired with other commands to achieve special functions, such as paired with the output programming to achieve fixed-point downward pressure, paired with the pause function to achieve midway adjustments, etc., whose coordinates can be moved by the arrow keys to teach, or by pressing the [Move] to directly input the coordinates.

Press [enter] key to add new positioning point successfully, you can teach the positioning point continuously until you press [End] to exit the moving interface.



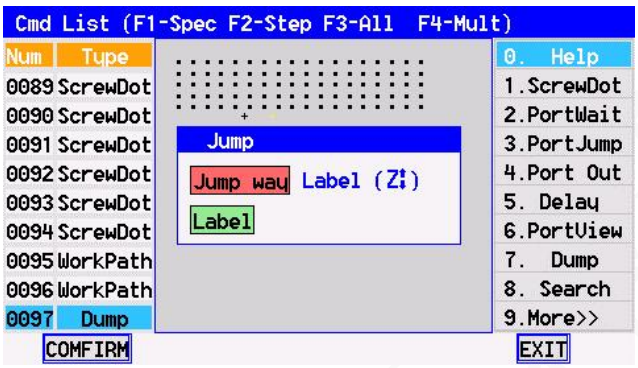


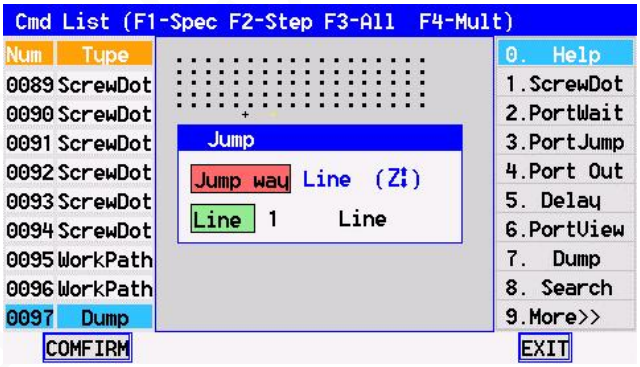
Programming styles and quick modifications.



5.8 Jump

It is used to jump to the set address/marker to continue running when executing the instruction at that line.



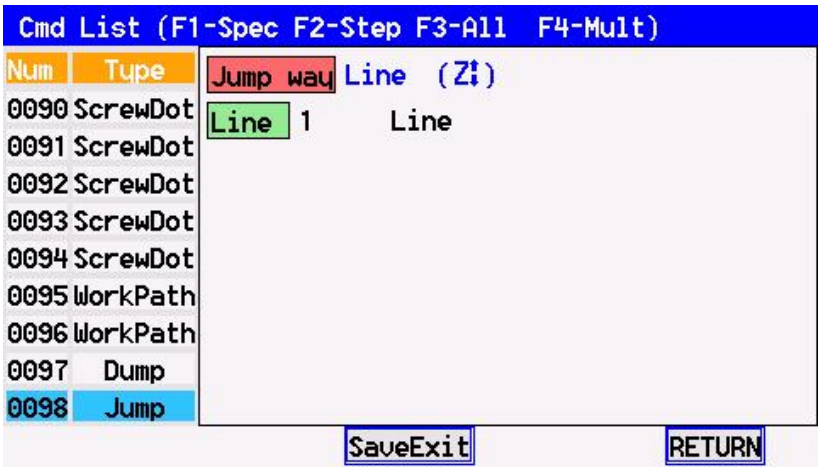


Jump Mode: the way to find the jump target position after executing to the line instruction, you can choose to jump directly by line number or find by mark.

Jump Label: the target label to be jumped when the condition is met in label jump mode.

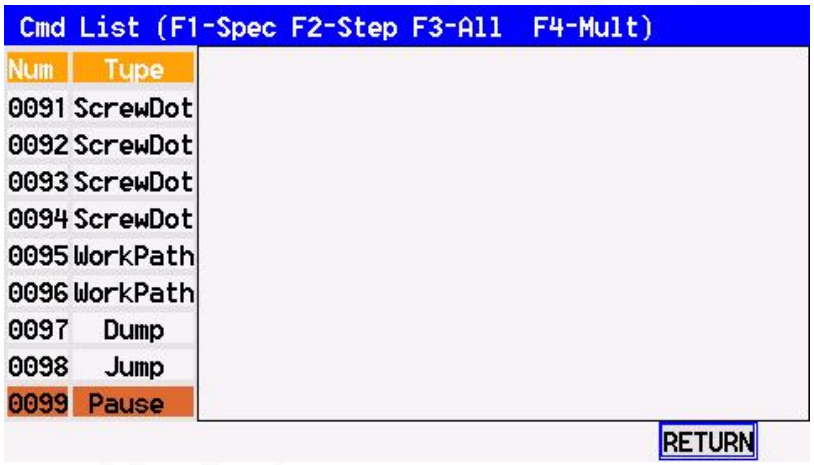
Jump line number: the target line number to be jumped when the condition is met in line number jump mode.

Programming style and quick modification.



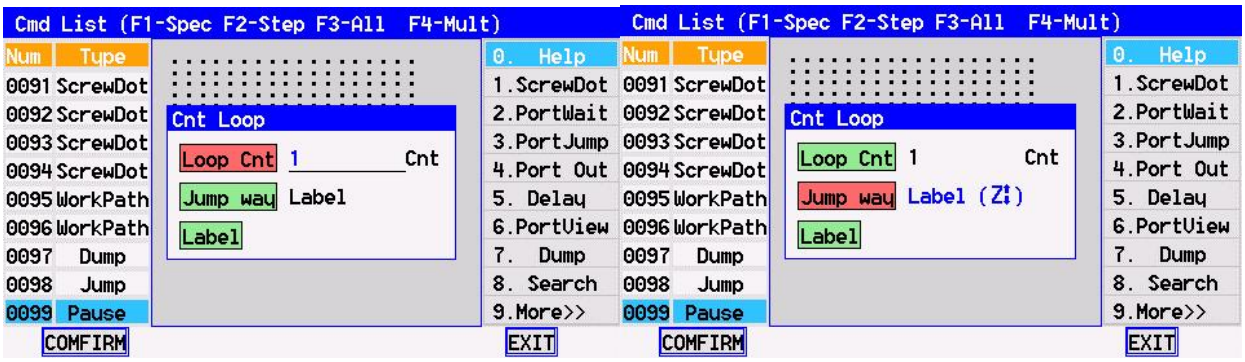
5.9 Pause

[Pause] The programme execution enters a pause state at this line of instruction, and then waits for the Run button to continue running again.



5.10 Counting loop

Execution of this instruction jumps to the set address/label and cycles the set number of times.



Cycle times: the number of cycle runs, including the current run.

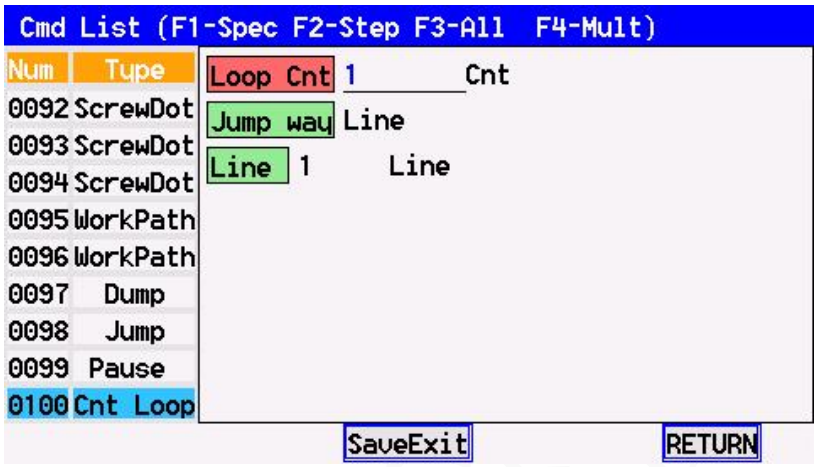
Jump Mode: the way to find the jump target position after executing the instruction in the line, you

can choose to jump directly according to the line number or find it according to the mark.

Jump label: the target label to be jumped when the condition is met in the label jump mode.

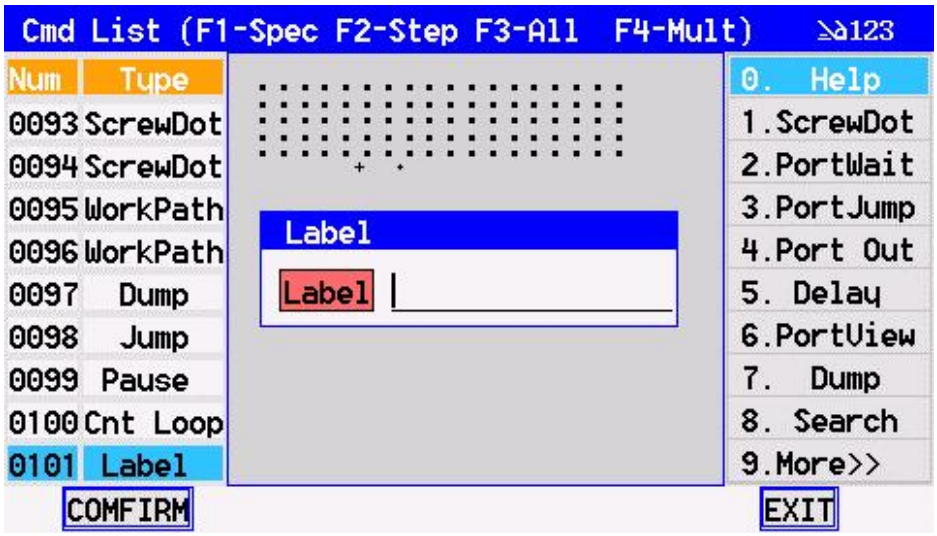
Jump line number: In line number jump mode, the target line number to be jumped when the condition is met.

Programming style and quick modification.

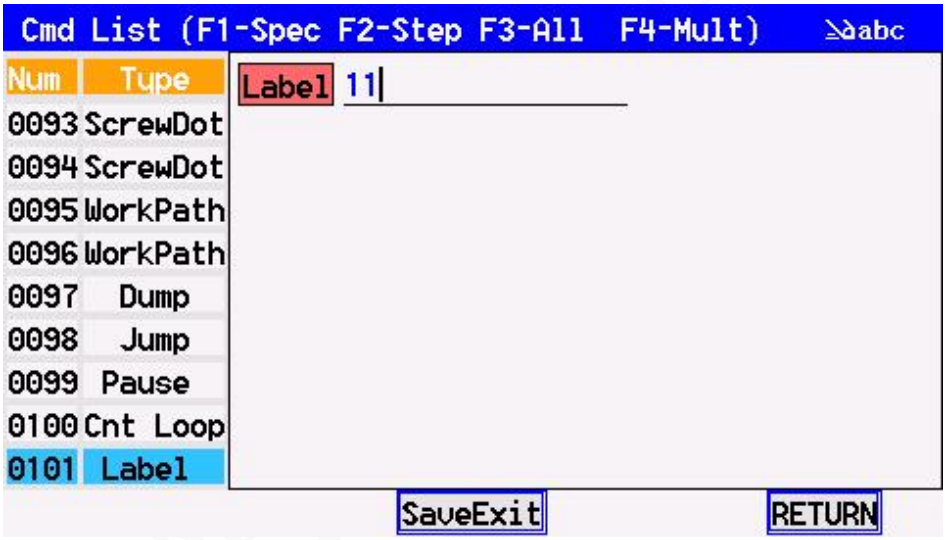


5.11 Label

Markers can be used to differentiate between segments of a programme or for searching by jump instructions. In contrast to a direct jump address, the markers are not affected by the order in which the programming instructions are inserted.

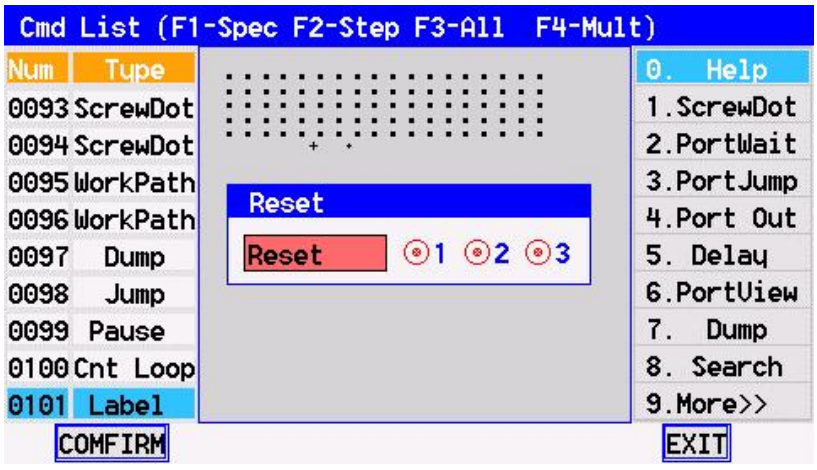


Programming styles and quick modifications.

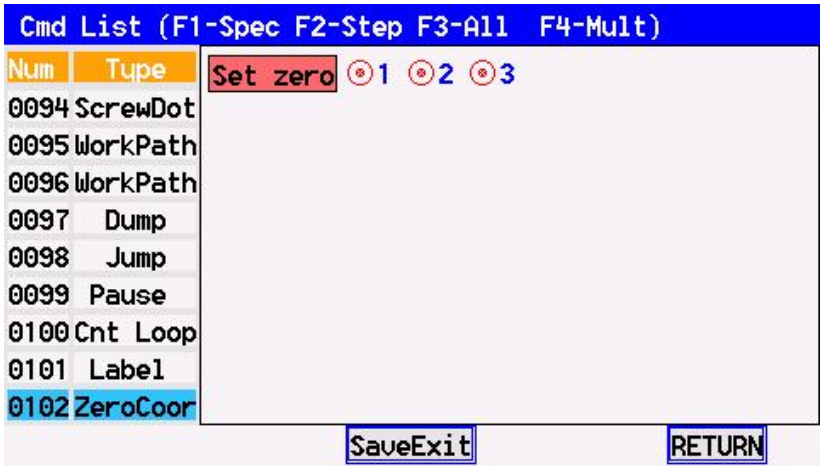


5.12 Axis of reset

Axis Reset:The program executes this line of instruction to reset the set axis to find the home position.

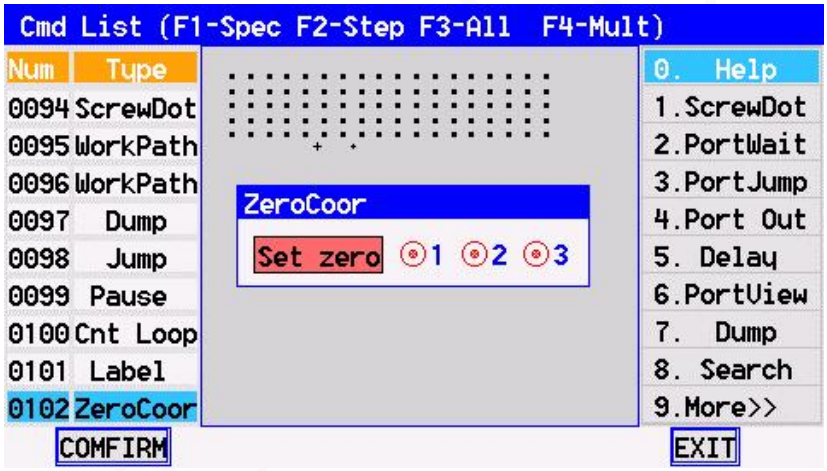


Programming styles and quick modifications.

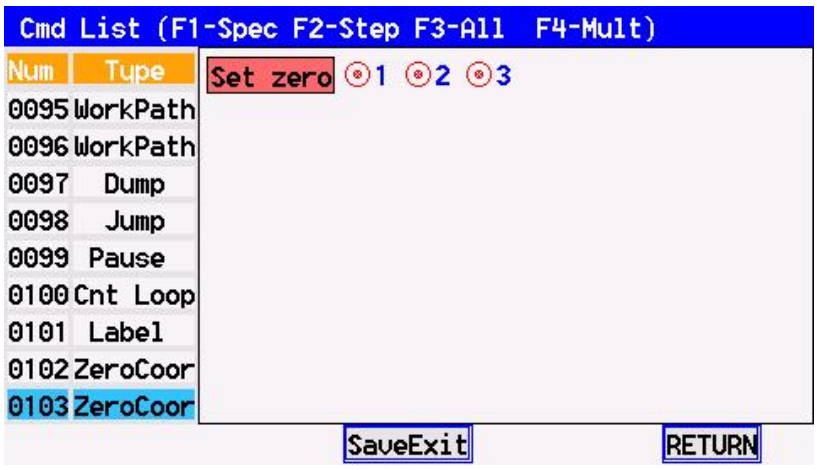


5.13 Axis Zero

Axis Zero:the program executes this line of instruction to zero the coordinates of the set axes.

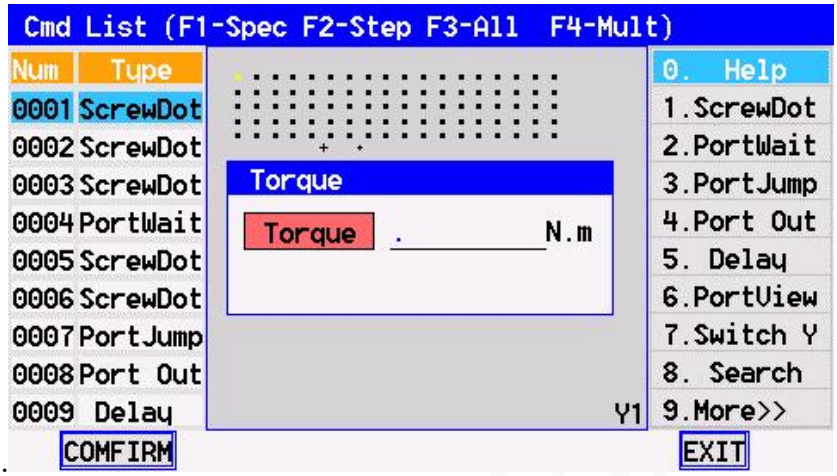


Programming styles and quick modifications.

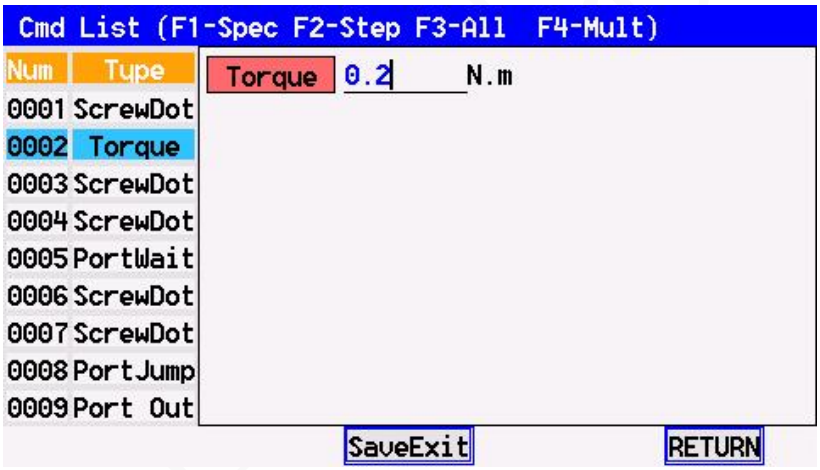


5.14 Torque

Torque Setting： required to open the intelligent wrench can be used, its role is to modify the wrench torque in the process of operation, to achieve a lock attached to a variety of torque screws needs.



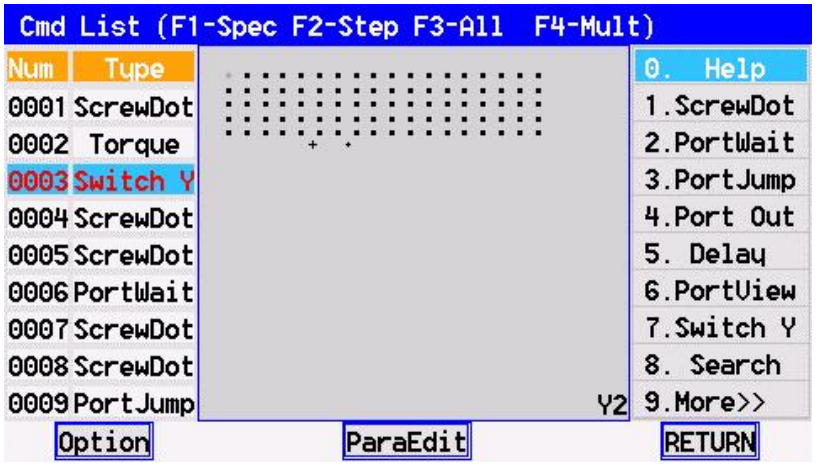
Programming styles and quick modifications.



5.15 Y-axis change

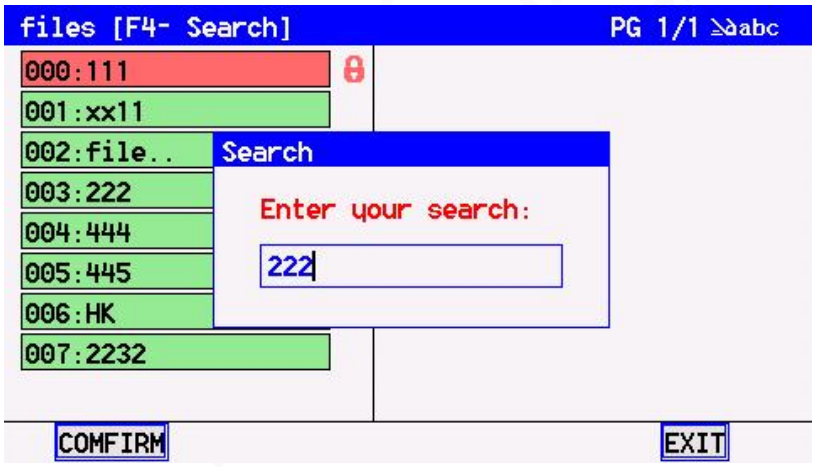
Y-axis switching： This instruction is exclusively for double Y mode, if the cursor is in front of this instruction, then pressing the direction key Y is to control Y1 axis, if the cursor is after this instruction, then pressing the direction key is to control Y2;

This instruction is also used as the dividing line when running, the front of the instruction is Y1 area, and the back of the instruction is Y2 area.

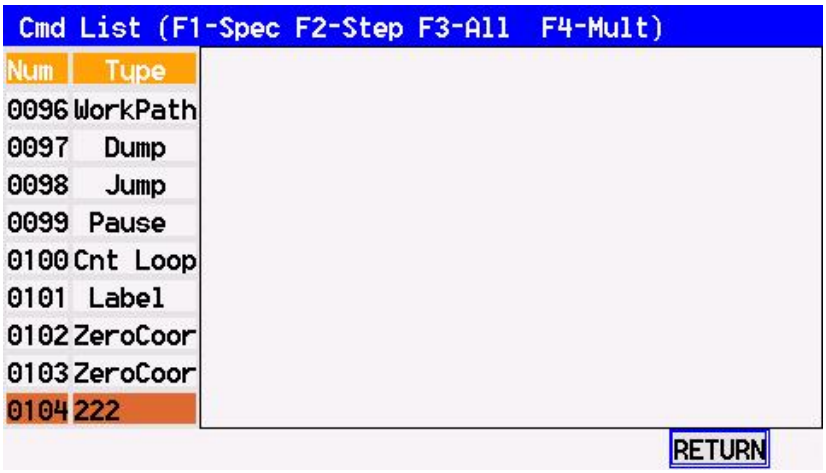


5.16 File call

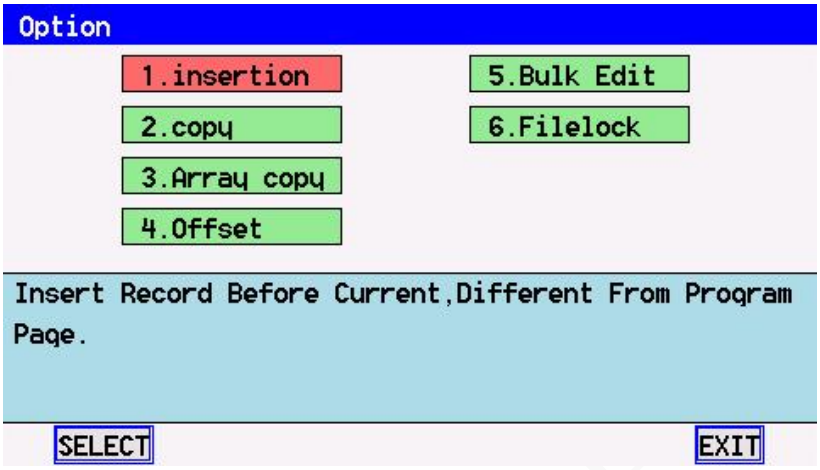
When this instruction is executed, the target line number will be called from this position to run. In case of double-Y mode, only the corresponding Y-axis part of the programming will be executed, and the file calling instruction in the calling file will not be executed, and the remaining programming of the initial file will be executed after the execution of the calling file is completed.



Programming Style.



Chapter 6 Programming Instructions



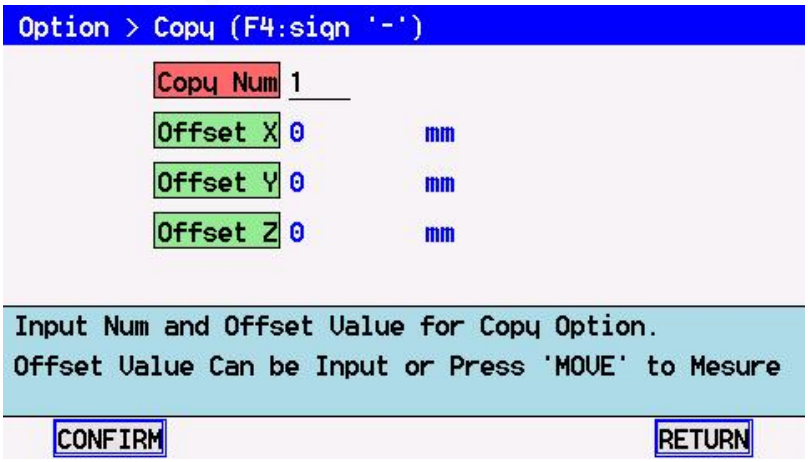
6.1 Insert command

Insert command：means to insert to the previous line of the instruction selected by the cursor. The method is the same as adding a new instruction.

6.2 Copy command

Copy command：Used to copy the selected instructions, usually used for the selected instructions of the single direction copy. y key up and down to switch to select the single instruction to be copied, F3 is to select all the instructions to be copied, F4 is to select multiple instructions to be copied.

After selecting the instructions to be copied, press [Operation] to enter the [Copy Instructions] dialogue box, as shown in the figure.

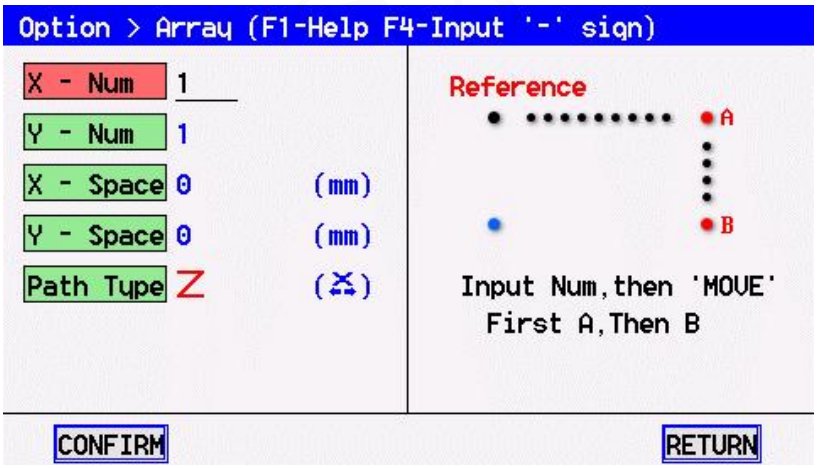


Method 1: Enter the number of copies to be copied, if you know the distance between the coordinates of the instructions to be copied, you can directly enter the distance between the coordinates of each axis (the distance between the coordinates and the coordinates), press [enter]key to complete the copy.

Method 2: Enter the number of copies to be copied, if you do not know the distance between the coordinates of the instructions to be copied, you do not need to enter the coordinate spacing of each axis, directly press the [Move] key, move the device to the starting point of the last graph to be copied by using the arrow keys, press the [enter] key, the system will automatically calculate the distribution of its interval in accordance with the distance between and the number of copies.

6.3 Array copying

The Y arrow key toggles up and down to select a single instruction to be copied, F3 to select all instructions to be copied, and F4 to select multiple instructions to be copied. After selecting the instructions to be copied, press [Operation] to enter the [Array Copy] dialogue box, as shown in the figure.



Method 1: Enter the number of X-direction and Y-direction copies to be arrayed, and then press the Move: key to move to the last point of the X-direction (that is, point A in the figure) and press .

Confirm: then move to the last point of the Y-direction (that is, point B in the figure) and press [enter]; the spacing can be calculated automatically. Be sure to enter the number of copies first.

Path way: run track selection.

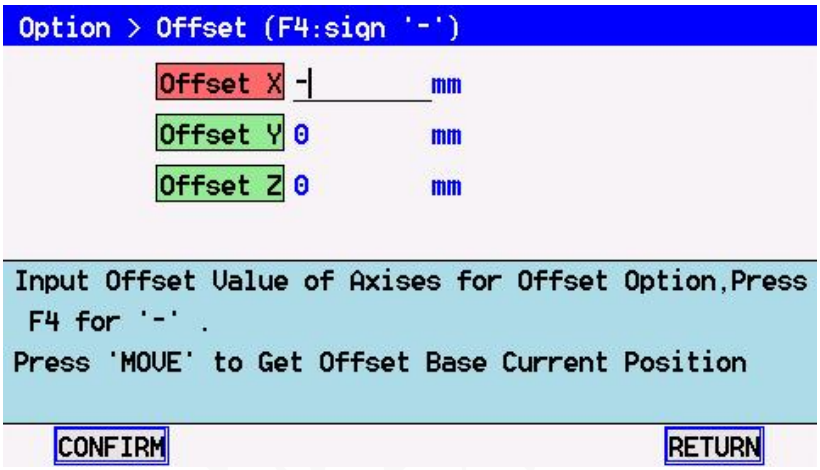
Method 2: Input the number of X-direction and Y-direction to be arrayed and copied, then input the X-direction spacing and Y-direction spacing to be arrayed and copied, and then select the path way.

Finally, press the [enter] key to complete the array copy.

6.4 Offset operation

Offset operation： Used to offset the selected action command by shifting the coordinates by the specified value.

The Y key selects a single instruction to be offset, F3 selects all instructions to be offset, and F4 selects multiple instructions to be offset. After selecting the instruction to be offset, press [Operation] to enter the [Offset Operation] dialogue box, as shown in the figure.



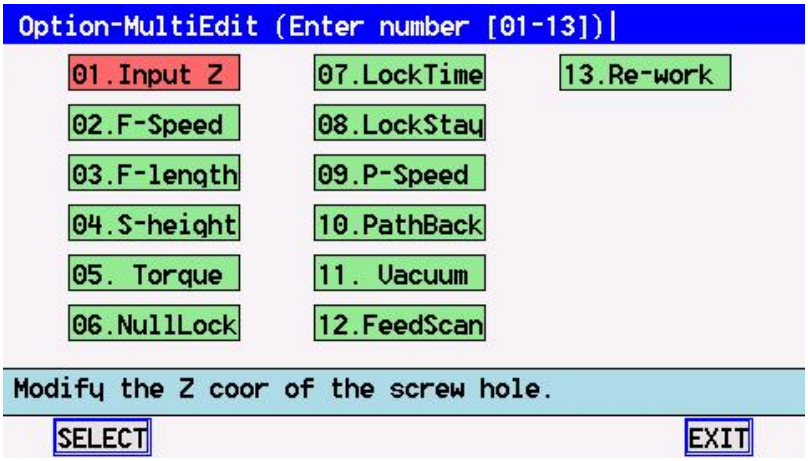
Method 1: Enter the specific data to be offset and press [Enter] to complete the offset operation.

Method 2: If you don't know the specific data to be offset, you can also use the [Move] key to move the data to be offset. Press the [Move] key, use the arrow keys to move the device to the coordinates to be offset, and then press the [Enter] key to complete the offset operation.

6.5 Batch modification

Batch modification: Used for batch modification of a parameter to improve editing efficiency.

The specific operation is as follows: F3 is to select all instructions, F4 is to select multiple instructions. Press ‘Batch Modify’ to enter the following dialogue box.

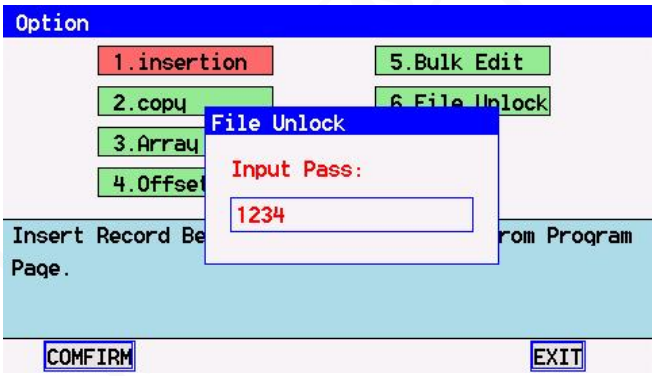


Select the parameters to be modified one by one, and then press [Enter] key to complete the modification action.

6.6 File Lock/File Unlock

The current file can be locked or unlocked.

Programming screen displays a red lock icon in the upper right corner of the screen after locking.



When the current file is locked, it will be unlocked, and you need to enter the user password to unlock it.